

**THE NATIONAL BIOLOGICAL DIVERSITY CON-
SERVATION AND ENVIRONMENTAL RESEARCH ACT**

HEARINGS

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND ENVIRONMENT
OF THE

COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDREDTH CONGRESS

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CONTENTS

WITNESSES

June 9, 1988:

Hon. Daniel K. Akaka, a Representative in Congress from the Second District of Hawaii.....	Page 8
Dr. Eugene Hester, Associate Director, National Park Service; F. Dale Robertson, Chief, U.S. Forest Service; and Roland G. Robison, Deputy Director, Bureau of Land Management, accompanied by David Almand, Chief of the Division of Wildlife and Fisheries, BLM.....	21
Dr. M. Rupert Cutler, Defenders of Wildlife; Dr. Faith Campbell, Natural Resources Defense Council; Barry Flamm, the Wilderness Society; James H. Pissot, National Audubon Society; and Dr. Mark Plotkin, World Wildlife Fund.....	59

June 30, 1988:

Hon. Elliot Richardson, Roger Tory Peterson Institute.....	207
Dr. Thomas Lovejoy, Assistant Secretary for External Affairs, Smithsonian Institution.....	219
Dr. Peter H. Raven, Director, Missouri Botanical Garden.....	224
Dr. John D. Buffington, Deputy Regional Director for Research, U.S. Fish and Wildlife Service.....	251
John Flicker, Vice President, U.S. Operations, The Nature Conservancy ...	259
D. Daniel Boone, Coordinator, Maryland National Heritage Program	274

APPENDIX—Additional material submitted for the record:

1. Article by Dr. J. Michael Scott, Department of Fish and Wildlife Resources, College of Forestry, Wildlife, and Range Sciences, University of Idaho.....	296
2. Statement for the Record submitted by The National Forest Products Association.....	305
3. Statement for the Record submitted by the New York State Biological Survey.....	309
4. "Assessing the Adequacy of Biological Diversity Databases", text of address to the Ecological Society of America, University of California, Davis, by Donald L. Falk and Kerry S. Walter, Center for Plant Conservation.....	316
5. Letter from David T. Kingsbury, National Science Foundation.....	324
6. Letter from Henry L. Shands, National Program Leader, Germplasm, Agricultural Research Service, U.S. Department of Agriculture.....	326
7. Letter from Robert R. Brumley, General Counsel, U.S. Department of Commerce.....	328
8. Letter from Frank Press, President, National Academy of Sciences.....	331
9. Letter from Lorin I. Nevling, Chief, Illinois Natural History Survey.....	335
10. Letter from Laurence R. Jahn, President, Wildlife Management Institute.....	337
11. Letter from Harry E. Hodgdon, Executive Director, The Wildlife Society.....	340
12. Letter from Boyce Thorne Miller, Staff Scientist, The Oceanic Society.	342
13. Letter from Edward C. Schmitt, Chairman, Legislation Committee, and Kristin L. Vehrs, American Association of Zoological Parks and Aquariums Legislative Representative, American Association of Zoological Parks.....	345
14. Letter from John W. Grandy, Vice President, Wildlife and Environment, The Humane Society of the United States.....	349
15. Letter from John F. Schlegel, Doctor of Pharmacology, President, American Pharmaceutical Association.....	351

IV

	Page
16. Letter from Michael E. Soule, President, Society for Conservation Biology	353
17. Resolution supporting H.R. 4335 from the American Institute of Biological Sciences.....	356
18. Resolution from the American Ornithologists Union.....	357
19. Letter from Mary H. Clench, President, Wilson Ornithological Society.....	359
20. Resolution from the Animal Behavior Society.....	360
21. Resolution from the Cooper Ornithological Society	361
22. Letter from Tod F. Stuessy, President, American Society of Plant Taxonomists.....	362
23. Statement for Record submitted by the Club of Earth, Commission on Life Sciences, National Research Council.....	364
24. Letter from Daniel R. Katz, President, New York Rainforest Alliance..	366
25. Letter from Mrs. G. Richard Dew, National Council of State Garden Clubs, Inc.....	367
26. Additional Record Information submitted by Paul Wachtel, Head, Creative Service, World Wide Fund.....	368
27. Letter and article, "Basic Research Needs for Tropical Conservation Biology: A Timetable", from David Cameron Duffy, Visiting Professor, Universidad Nacional, Heredia, Costa Rica.....	383
28. Letter from W. Carl Taylor, Secretary, AFS, Milwaukee Public Museum	397
29. Letter from Marjorie M. Holland, Director, The Ecological Society of America	399
30. Letter from Peter C. Myers, Acting Secretary, U.S. Department of Agriculture.....	401
31. Letter from Kathleen A. Buck, General Counsel, U.S. Department of Defense	404
32. Letter from W. Hardy Eshbaugh, BSA President, on behalf of the Council and the Membership of the Botanical Society of America	406

THE NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND ENVIRONMENTAL RESEARCH ACT

THURSDAY, JUNE 9, 1988

HOUSE OF REPRESENTATIVES, COMMITTEE ON SCIENCE,
SPACE, AND TECHNOLOGY, SUBCOMMITTEE ON NATURAL
RESOURCES, AGRICULTURAL RESEARCH AND ENVIRON-
MENT,

Washington, DC.

The subcommittee met, pursuant to notice, at 9:35 a.m., in room 2318, Rayburn House Office Building, Hon. James H. Scheuer presiding.

Members present: Representatives Scheuer, Schneider, and Brown.

Staff present: Michael Rodemeyer, staff director and counsel; Wesley Warren, Republican technical consultant; and, David Blockstein, AIBS/ASZ science fellow.

Mr. SCHEUER. Good morning. The Subcommittee on Natural Resources, Agricultural Research and Environment will come to order.

Today, this subcommittee will hold the first of 2 days of hearings on H.R. 4335, cosponsored by myself and our distinguished ranking member, Congresswoman Claudine Schneider, the National Biological Diversity Conservation and Environmental Research Act.

We have been waiting for Congressman Akaka, who is scheduled to be with us. He seems to be delayed so we'll probably go ahead with our Federal panel and then—at least to take the affirmative testimony—and then perhaps sandwich Congressman Akaka in when he arrives.

OK, this bill is in response to the disturbing testimony we have heard in two prior hearings about the alarming decline of biological diversity in this country and in the world.

It's a truism, it's become a truism to say that by the end of this century, it's estimated that the world will have lost perhaps 20 percent of its species, both animal and vegetable.

The world's biological diversity, its rich genetic material, its species, its ecosystems, are becoming a silent victim to relentless development.

Scientists tell us, as I've said, that by the year 2000 we are scheduled, if we keep on at the alarming present rate, to lose forever as many as 20 percent of the Earth's animal and vegetable species.

Indeed, we're on the verge of a catastrophe as great as that which exterminated the dinosaurs 65 million years ago. But that was the result of some kind of an astronomical catastrophe.

The one that's happening now is a human catastrophe, caused by humans. Many animals have survived, as I say, the 30 million years that the rhino has been around and they've coped with every known predator except in recent decades of mankind.

The loss of biological diversity may seem to some as possibly interesting but nevertheless irrelevant and esoteric and arcane business, of interest mostly to pointy-headed professors.

Nothing could be further from the truth. Our generation, and generations to come, will be immeasurably impoverished and deprived by unthinking destruction, by our unthinking destruction, of our biological resources.

Some of the loss will be unseen and hard to quantify, such as the loss of a plant containing a possible cure for cancer or AIDS.

Other effects are subtle, such as the loss of crop yield in an agricultural monoculture because the genetic diversity needed to resist disease has been lost.

Other losses are more direct, such as the extinction of well-known animals such as the passenger pigeon and the near disappearance of rhinos from the wild.

But the loss of diversity goes far beyond depriving us and future generations of products that may enhance our lives.

Indeed, reduced biological diversity may disrupt fundamental environmental processes. The ecological consequences are severe, they are not easy to predict, but they may include climate change, loss of productivity of both soil and water, and interference with the cycling of nutrients.

We need urgently to understand that biological diversity is our biological capital. It must be protected wisely, like our capital, to ensure a secure future for ourselves and our grandchildren.

H.R. 4335, which we two have introduced, will not stop the biological diversity crisis, but we hope it will slow the destruction. It will set up a system whereby science, planning, and coordination are used to prevent losses of biological diversity and to avoid the need for costly last-ditch efforts such as the endangered species act, which, in effect, amounts to closing the stable door after the horse has bolted.

Hopefully, this act will make the United States a model for all countries around the world in the battle to conserve biological diversity.

Here are some of the things that it would do. H.R. 4335 would make conservation of biological diversity a national goal and it would make efforts to maintain and restore biological diversity a national priority.

The bill would establish a National Center for Biological Diversity, to collect information necessary to conserve biological diversity and to put that information into an accessible and usable form.

It brings together the Federal management agencies, like the National Park Service, the Bureau of Land Management, among others, and it would bring them together with the scientific community to develop and implement a national strategy to preserve our biological resources.

And lastly, it would enable NEPA, the National Environmental Policy Act, to make consideration of biological diversity an explicit part of the environmental planning process.

Now before we turn to the witnesses, I'd like to recognize my very distinguished and highly contributory colleague, Congresswoman Claudine Schneider of Rhode Island.

Miss SCHNEIDER. Thank you very much, Mr. Chairman. Let me commend you for calling these hearings so expeditiously and for the very expert witnesses that we will be hearing from later this morning.

Let me state from the outset that I regret that at 10 I'm going to attempt to save the oceans, so I will have to dismiss myself while we're marking up an ocean dumping bill, but then I shall return afterwards.

This is a critically important hearing and a vitally important issue. There is no question that global loss of biological diversity is a tragic trend that we are currently witnessing and that affects all of us.

Over 100 plant and animal species are becoming extinct worldwide each year and much of this loss is occurring in tropical rain forests where an area the size of the State of California is being destroyed every 24 months.

Certainly, if this is not enough to move us into action, then I think we need only to look here in the United States.

Even in the United States, the health of ecological systems is being threatened by a steady loss of plant and animal species.

I think one of the things that is of very much concern to me that this particular bill will assist us in doing, is to first realize the database that we do have.

What plants and animals do we have in this country? I think that H.R. 4335 will make an important contribution toward conserving the variety of our natural resources here at home.

But almost more importantly than that, I think that this piece of legislation will set an example for other countries to follow.

If we are going to maintain any form of leadership, I think that it's important that we strengthen our claim to international leadership through example.

Biological diversity is very critical to our nation, to our world. It's essential to regulating the climate. Often times, this impact is overlooked, but as we're looking at the greenhouse effect and global warming, that has very much made us aware of the interconnectedness of these systems.

It also maintains nutrient cycles, it offers a natural storehouse of agricultural products and medicines, and provides recreational opportunities.

Aside from all of those fun things, there are economic values that we all must also take into account. The commercial timber, fisheries, and fur industries mainly depend upon the harvesting of wild species.

The Office of Technological Assessment estimates that—excuse me, of Technology Assessment, estimates that altogether, the average value of wild resources produced or imported into the United States exceeds \$27 billion a year.

Just to share with you some examples. About 25 percent of the prescription drugs in the United States are derived from plants that live in the wild.

Also, there have been many advances in agriculture that depend on cross-breeding with previously uncultivated plant species, such as the case of adapting the Peruvian tomatoes to the domestic tomato market.

And also great producers in the citrus industry use naturally occurring insect predators for cost-effective pest control.

The cost of these have not even been calculated. We also have to keep in mind that healthy wetlands provide flood control benefits. \$17 million a year in the case of the Charles River Wetlands.

I think what we need to ask ourselves is how did we allow the situation to arise. I think that the main reason that so many species have been driven to the verge of extinction is because we have followed, in the past, a policy that is reactive as opposed to proactive.

H.R. 4335 will reorient the U.S. environmental policy so that it is preventative before the species are lost forever.

Let me also mention that in the past the United States was one of the leaders in the world on the whole issue of conserving biological diversity.

During the 1970's, we played a major role in creating the United Nations Environment Program, in securing the convention on international trade and endangered species, and also in establishing the world heritage convention.

But since then, regrettably, U.S. leadership on biodiversity has diminished somewhat. In some cases, our financial support for these program has declined, and in other cases, such as UNESCO's Man and the Biosphere Program, we have disassociated ourselves from the main international effort.

Nevertheless, there are currently a number of international efforts underway to promote greater biological diversity and we certainly could and should play a key role.

The Tropical Timber Agreement of 1985 established a system of cooperation between the major world producers and consumers of tropical timber.

Certainly our leadership is needed there. Then last July, UNEP convened an international strategy meeting on tropical forests in Bellagio, Italy, which set forth 10 recommendations to deal with tropical forest crises.

Certainly we have to keep in mind that there are many non-governmental organizations, World Wildlife in particular, and Conservation International, that have been involved in reducing the third world debt through debt swaps, which is probably one of the more innovative creative ways of us tackling two problems at the same time.

However, if the United States is really going to assume leadership on this issue, and it is leadership that I believe we ought to take and we have the capability of taking, we have to do more to set an example.

Passage of H.R. 4335 would help to show other countries the way toward responsible resource management policies.

But it would also strengthen the hands of our negotiators when they're dealing with these issues. So I think that for these reasons alone, the justification for H.R. 4335 is enormous.

I am hopeful that the witnesses today will specifically address the direction and the specifics of our bill, and I look forward to some expert testimony.

I thank you, Mr. Chairman, for calling this hearing and look forward to us resolving any questions that might exist. Thank you.

[The prepared opening statement of Miss Schneider follows:]

OPENING STATEMENT BY CLAUDINE SCHNEIDER
 HEARING ON BIOLOGICAL DIVERSITY
 June 9, 1988

THE GLOBAL LOSS OF BIOLOGICAL DIVERSITY IS A TRAGIC TREND THAT AFFECTS ALL OF US. OVER 100 PLANT AND ANIMAL SPECIES BECOME EXTINCT WORLDWIDE EACH YEAR. MUCH OF THIS LOSS IS OCCURRING IN TROPICAL RAIN FORESTS, WHERE AN AREA THE SIZE OF THE STATE OF CALIFORNIA IS BEING DESTROYED EVERY 24 MONTHS.

HOWEVER, EVEN IN THE U.S., THE HEALTH OF ECOLOGICAL SYSTEMS IS BEING THREATENED BY A STEADY LOSS OF PLANT AND ANIMAL SPECIES. H.R. 4335 WILL MAKE AN IMPORTANT CONTRIBUTION TOWARD CONSERVING THE VARIETY OF OUR NATURAL RESOURCES AT HOME. FURTHERMORE, BY TAKING THIS ACTION, WE WILL SET AN EXAMPLE FOR OTHER COUNTRIES AND STRENGTHEN OUR CLAIM TO INTERNATIONAL LEADERSHIP IN THIS FIELD.

WHY IS THE CONSERVATION OF BIOLOGICAL DIVERSITY SO IMPORTANT?

BIOLOGICAL DIVERSITY IS ESSENTIAL TO REGULATING CLIMATE -- AS THE GREENHOUSE EFFECT AND GLOBAL WARMING HAVE MADE US AWARE. IT ALSO MAINTAINS NUTRIENT CYCLES, OFFERS A NATURAL STOREHOUSE OF AGRICULTURAL PRODUCTS AND MEDICINES, AND PROVIDES RECREATIONAL OPPORTUNITIES.

THE ECONOMIC VALUE ALONE OF BIOLOGICAL DIVERSITY IS ENORMOUS. THE COMMERCIAL TIMBER, FISHERY, AND FUR INDUSTRIES MAINLY DEPEND UPON THE HARVESTING OF WILD SPECIES. THE OFFICE OF TECHNOLOGY ASSESSMENT ESTIMATES THAT ALTOGETHER THE AVERAGE VALUE OF WILD RESOURCES PRODUCED OR IMPORTED INTO THE U.S. EXCEEDS \$27 BILLION A YEAR.

HERE ARE SOME EXAMPLES:

- O ABOUT 25% OF THE PRESCRIPTION DRUGS IN THE U.S. ARE DERIVED FROM PLANTS THAT LIVE IN THE WILD;
- O ADVANCES IN AGRICULTURE OFTEN DEPEND UPON CROSSBREEDING WITH PREVIOUSLY UNCULTIVATED PLANT SPECIES, AS IN THE CASE OF ADAPTING PERUVIAN TOMATOES TO THE DOMESTIC TOMATO MARKET;
- O GRAPE PRODUCERS AND THE CITRUS INDUSTRY USE NATURALLY OCCURRING INSECT PREDATORS FOR COST-EFFECTIVE PEST CONTROL;
- O HEALTHY WETLANDS PROVIDE FLOOD CONTROL BENEFITS -- \$17 MILLION A YEAR IN THE CASE OF THE CHARLES RIVER WETLANDS.

DESPITE THE VALUE OF BIOLOGICAL DIVERSITY, IN THE U.S., EXTINCTION THREATENS HUNDREDS OF ANIMALS AND THOUSANDS OF PLANTS.

HOW DID WE ALLOW THIS SITUATION TO ARISE?

THE MAIN REASON SO MANY SPECIES HAVE BEEN DRIVEN TO THE VERGE OF EXTINCTION IS BECAUSE WE HAVE FOLLOWED IN THE PAST A POLICY THAT IS REACTIVE, NOT PRO-ACTIVE. H.R. 4335 WILL REORIENT U.S. ENVIRONMENTAL POLICY SO THAT IT IS PREVENTATIVE, ASSESSING THE EFFECT OF OUR ACTIVITIES ON BIOLOGICAL DIVERSITY BEFORE SPECIES ARE LOST FOREVER.

IN THE PAST, THE U.S. WAS ONE OF THE LEADERS IN THE WORLD ON THE ISSUE OF CONSERVING BIOLOGICAL DIVERSITY. FOR EXAMPLE, DURING THE SEVENTIES, WE PLAYED A MAJOR ROLE IN:

- O CREATING THE UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP);
- O SECURING THE CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES (CITES); AND
- O ESTABLISHING THE WORLD HERITAGE CONVENTION.

SINCE THEN, HOWEVER, U.S. LEADERSHIP ON BIODIVERSITY HAS DIMINISHED SOMEWHAT. IN SOME CASES, OUR FINANCIAL SUPPORT FOR THESE PROGRAMS HAS DECLINED. IN OTHER CASES, SUCH AS UNESCO'S MAN AND THE BIOSPHERE PROGRAM, WE HAVE DISASSOCIATED OURSELVES FROM THE MAIN INTERNATIONAL EFFORT.

NEVERTHELESS, THERE ARE CURRENTLY A NUMBER OF INTERNATIONAL EFFORTS UNDERWAY TO PROMOTE GREATER BIOLOGICAL DIVERSITY IN WHICH THE U.S. COULD PLAY A KEY ROLE:

- O THE INTERNATIONAL TROPICAL TIMBER AGREEMENT OF 1985 ESTABLISHED A SYSTEM OF COOPERATION BETWEEN THE MAJOR WORLD PRODUCERS AND CONSUMERS OF TROPICAL TIMBER.
- O LAST JULY, UNEP CONVENED AN INTERNATIONAL STRATEGY MEETING ON TROPICAL FORESTS IN BELLAGIO, ITALY WHICH SET FORTH 10 RECOMMENDATIONS TO DEAL WITH THE TROPICAL FOREST CRISIS;
- O CURRENTLY, CERTAIN NONGOVERNMENTAL ORGANIZATIONS HAVE BEEN INVOLVED IN SWAPPING REDUCED DEBT OBLIGATIONS IN THIRD WORLD COUNTRIES IN RETURN FOR CONSERVATION COMMITMENTS FROM THEM, IN (BOLIVIA IS A RECENT EXAMPLE.

HOWEVER, IF THE U.S. IS GOING TO ASSUME THE LEADERSHIP POSITION ON THIS ISSUE THAT WE DESERVE, WE CAN AND SHOULD DO MORE TO SET AN EXAMPLE FOR OTHER COUNTRIES. PASSAGE OF H.R. 4335 WOULD HELP TO SHOW OTHER COUNTRIES THE WAY TOWARD RESPONSIBLE RESOURCE MANAGEMENT POLICIES, AND WOULD STRENGTHEN THE HANDS OF OUR NEGOTIATORS WHEN THEY DEAL WITH THESE ISSUES.

I LOOK FORWARD TO THE THIS SUBCOMMITTEE'S HEARINGS ON THIS SUBJECT AND COMMEND THE CHAIRMAN FOR MOVING FORWARD ON THIS VITAL ISSUE.

Mr. SCHEUER. Thank you very much, Congresswoman Schneider. Well, our first witness and our star witness has arrived. Congressman Akaka, will you come to the witness table?

Congressman Akaka of Hawaii has been a very productive contributor to the work of this subcommittee. We have had hearings in Hawaii before and we plan to hold a hearing in Hawaii next January with Congressman Akaka's leadership and contribution on the subject of biological diversity and on the subject of ground water, both of which are very serious problems in Hawaii.

Hawaii represents perhaps our richest biological resource of all the 50 States and also represents perhaps the most threatening conditions to our biological diversity.

So we're very happy to have our distinguished colleague from Hawaii here today. He has a long record of caring and involvement on all kinds of environmental matters and we look forward to a continued close-working relationship between him and our Subcommittee.

So please take such time as you may need, Congressman, and then I'm sure we'll have some questions for you.

STATEMENT OF THE HONORABLE DANIEL K. AKAKA, A REPRESENTATIVE IN CONGRESS FROM THE SECOND DISTRICT OF HAWAII

Mr. AKAKA. Thank you very much, Mr. Chairman and members of the Natural Resources Subcommittee, for this opportunity to appear before you and to tell you something about Hawaii and to express my support for your bill, H.R. 4335, a bill to promote the conservation of biological diversity.

Before proceeding, Mr. Chairman, I want to commend you for the vision and the understanding that prompted this legislation. I also want to commend you for your work, not only in our country but in foreign countries, in preserving the biological diversities there, and I want to mention the trip that we did take to China with Congresswoman Schneider and the great education that I had with you and your committee there, and hope that this will continue.

Mr. SCHEUER. Congressman.

Mr. AKAKA. Yes.

Mr. SCHEUER. Let me just put a footnote on that, and indicate the remarkable contribution that you made to the productiveness of that trip and the success of that trip. Our State Department was having difficulty in getting two-way communications going with the Chinese. We had certain—

This is off the record.

[Discussion off the record.]

Mr. AKAKA. Thank you very much, Mr. Chairman, for recalling that trip that we made to China. But that makes my point, Mr. Chairman, that with your leadership you've caused some of these monumental movements to happen.

I also want to commend you for your part in this in bringing a comprehensive global kind of view to the kind of problems we are facing and your bill is facing here.

Each day, Mr. Chairman, biodiversity touches our lives in a complex and endless multitude of ways. It embraces the very foundation of life on our planet.

In case it is not apparent, as I said, I strongly support your bill, Mr. Chairman, to establish national policies to promote the conservation of biological diversity. The need is urgent, for without an immediate, national commitment, we will lose some of the most precious and irreplaceable resources our country and the world have to offer: our unique heritage of plants, animals, and other organisms that make possible much, or all, of the food, medicine, clean air, clean water, and countless other necessities that sustain our quality of life.

An irreversible decline of biological diversity is occurring as development encroaches upon our everglades of Florida, tall-grass prairies of Oklahoma, deserts of California, potholes of Oregon, wetlands of Texas, and tropical forests of Hawaii. Your bill meets this serious environmental challenge by advancing a national policy together with the necessary action plan for preserving our natural diversity.

Moreover, Mr. Chairman, your bill offers America the opportunity to show the world its commitment to the conservation of biological diversity. This legislation has my unqualified support. The day this bill is considered in the House and Senate and signed into law will come none too soon.

I appear before you today to speak about the immediate need to address this issue in Hawaii. Hawaii may be the 50th State, but it is the first in terms of biological diversity. Our unique islands are home to tens of thousands of species found nowhere else on Earth. Many face certain extinction unless we act now to protect these species. Nature will not offer us a second chance, as we know.

Although comprising less than 0.2 percent of the total land area of the United States, Hawaii is home to more than 25 percent of our country's endangered and threatened plants and animals. It is a sad but sobering fact that Hawaiian species account for more than 70 percent of all recorded extinctions in the United States.

Perhaps no place on Earth has as unique a biological heritage as Hawaii. Before the arrival of man, it is likely that more than 90 percent of the species inhabiting Hawaii were found nowhere else on Earth. Before man, Hawaii was home to as many as 15,000 to 20,000 species of insects, over 99 percent of which were endemic. Our islands were populated with a host of flightless birds, rail, geese, and one of only two known flightless ibis.

An alarming number of these original species are extinct, and an equally large number of those that remain are endangered or threatened. For example, of the 75 different kinds of birds that existed at the time of European contact, 23 are now extinct, and 30 of the remainder are either endangered or threatened.

Why does this loss of biodiversity cause so much concern? It is because of the great value this diversity holds for mankind. For example, research on the endemic Hawaiian hibiscus made possible the development of the thousands of horticultural varieties now used in the modern hibiscus industry. Anti-cancer compounds have been found in two endemic Hawaiian plant species. One is called the akia in Hawaiian. Hawaii's native cotton has been bred with

commercial varieties to provide a hybrid that is less susceptible to attack by bollworms, aphids, mealybugs, and scale insects.

The potential exists for the use of the native spurge as a source of natural rubber, and researchers are investigating Hawaii's native raspberry, called akala, to improve fruit size and transfer its thornless quality to commercial raspberries.

Unfortunately, despite great vigilance, we are still losing habitats and species in Hawaii. What is equally frightening, however, is the extinction of species not yet discovered by man. A growing awareness of our declining biodiversity has spawned a number of initiatives in Hawaii that can serve as models for addressing the problems that your bill seeks to remedy.

Hawaii is fortunate enough to have an up-to-date inventory of its native higher plant life. Thanks to a project begun in 1982 by the Bishop Museum and now nearing completion, we know that there are about 1,000 plants native to Hawaii.

Projects similar to the Bishop Museum's native plant inventory are in progress to establish an accounting of Hawaii's native insects, birds, algae, and land snails. With additional support from the legislation before you, other essential information about the unique biota of Hawaii can be assembled to form an interlocking information base that will shed new light on our State's remarkable biodiversity.

In closing, Mr. Chairman, I do not want to leave this hearing room having understated the urgent need for action on the legislation before you. Without question, the continued loss of biological diversity will have profound consequences for the welfare of mankind.

Only recently have we begun to truly appreciate the scope of this problem and its effect on nature's subtle machinery. What we now know should be sufficient to frighten each of us into the realization that conserving biological diversity is nothing short of an ecological imperative for man and his future here on Earth.

I thank you very much, Mr. Chairman, for this opportunity to testify before you, and look forward to the time when you and your committee will be coming to Hawaii on a hearing. Thank you.

[The prepared statement of Mr. Akaka follows:]

This statement is dedicated to the memory of Dr. Wayne C. Gagne' of the Bishop Museum, whose tireless work to protect and preserve Hawaii's biological diversity will forever serve as an inspiration to scientists and laymen alike.

STATEMENT OF THE HONORABLE
DANIEL K. AKAKA
BEFORE THE SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURAL RESEARCH AND ENVIRONMENT
IN SUPPORT OF LEGISLATION TO PROMOTE THE CONSERVATION OF
BIOLOGICAL DIVERSITY (H.R. 4335)

JUNE 9, 1988

Chairman Scheuer and Members of the Natural Resources Subcommittee, thank you for the opportunity to appear before you to express my support for H.R. 4335, a bill to promote the conservation of biological diversity.

Before proceeding, I want to commend you for the vision and understanding that prompted ~~this~~ legislation. The concerns addressed by this bill are of monumental proportions. Each day, biodiversity touches our lives in a complex and endless multitude of ways. It embraces the very foundation of life on our planet.

In case it is not apparent, I strongly support H.R. 4335, legislation to establish national policies to promote the

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

conservation of biological diversity. The need is urgent, for without an immediate, national commitment we will lose some of the most precious and irreplaceable resources our country and the world have to offer -- our unique heritage of plants, animals, and other organisms that make possible much or all of the food, medicine, clean air, clean water, and countless other necessities that sustain our quality of life. An irreversible decline of biological diversity is occurring as development encroaches upon our everglades of Florida, tall grass prairies of Oklahoma, deserts of California, potholes of Oregon, wetlands of Texas, and tropical forests of Hawaii. With each habitat that is destroyed and each species that becomes extinct, more biological diversity is forever lost and we travel further and further down a one-way path from which there is no return.

Technologies to Maintain Biological Diversity, a 1987 report on this issue by the Office of Technology Assessment, offers the following mandate for action: "Given the implications and irreversible nature of biological extinction, policy makers must continue to address the problem of diminishing biological diversity." H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act, meets this serious environmental challenge by advancing a national policy together with the necessary action plan for preserving our natural diversity. Moreover, Mr. Chairman, H.R. 4335 offers America the opportunity to show the world its commitment to the conservation

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

of biological diversity. This legislation has my unqualified support. The day this bill is considered in the House and Senate, and signed into law, will come none to soon.

I appear before you today to speak about the immediate need to address this issue in Hawaii. Hawaii may be the 50th state, but it is the first in terms of biological diversity. Our unique islands are home to tens of thousands of species found nowhere else on earth. Many face certain extinction unless we act now to protect these species. Nature will not offer us a second chance.

As a Representative from Hawaii, I come to plead our special case. Because of their isolation, the Hawaiian Islands are both biologically unique and acutely vulnerable. Hawaii is not alone, however. Habitats everywhere are becoming islands in a sea of ecological change.

Hawaii is also this country's primary tropical resource. Thus, it is one of the few locations in the United States where we have the opportunity to preserve tropical ecosystems. And, because the vast majority of the world's biological diversity lies in the tropics, Hawaii is the logical place to develop practical research strategies and cost-effective conservation methods that can be shared worldwide. Hawaii can serve as an evolutionary laboratory to further research vital to our understanding of much of the world's remaining biodiversity.

Although comprising less than 0.2% of the total land area of

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

the United States, Hawaii is home to more than 25% of our country's endangered and threatened plants and animals. It is a sad but sobering fact that Hawaiian species account for more than 70% of all recorded extinctions in the United States.

Perhaps no place on earth has as unique a biological heritage as Hawaii. Before the arrival of man, it is likely that more than 90% of the species inhabiting Hawaii were found nowhere else on earth. Before man, Hawaii was home to as many as 15,000-20,000 species of insects, over 99% of which were endemic. Our Islands were populated with a host of flightless rail, geese, and one of only two known flightless ibis.

An alarming number of these original species are extinct, and an equally large number of those that remain are endangered or threatened. For example, of the 74 different kinds of birds that existed at the time of European contact, 23 are now extinct (including all of the flightless ones) and 30 of the remainder are either endangered or threatened.

Without question, Hawaii is this country's premier natural laboratory for biological study. Although relatively young in geological terms, the great diversity of habitats throughout the islands, when combined with the strength of its biological diversity, make Hawaii an outstanding site for comparative studies in ecology and evolution.

For example, there are an estimated 1,000 different kinds of fruit flies unique to Hawaii. These represent one of the greatest concentrations of closely related species known in the

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

world. Research conducted through the Drosophila Project at the University of Hawaii has not only expanded our knowledge of the Hawaiian biota but has also greatly improved our understanding of evolutionary and ecological processes in general. Information from this apparently esoteric research program is now being applied to help understand the biology of the highly destructive Mediterranean fruit fly so that environmentally safe eradication and control procedures can be developed to cope with this agricultural nuisance.

Such research can have huge payoffs. The Med-fly infests some 250 different crops. It cost federal and state governments in excess of \$100 million to eradicate California's 1981 Med-fly outbreak. The fruit fly research project underscores the role of the Hawaiian Islands in biological research, and illustrates the application of such research to solving biological problems that confront us.

There are numerous examples of research in Hawaii that has produced creative solutions to biological problems. For example, research on the endemic Hawaiian Hibiscus made possible the development of the thousands of horticultural varieties now used in the modern Hibiscus industry. Anti-cancer compounds have been found in two endemic Hawaiian plant species (both are of the genus Wikstroemia and bear the native name 'akia'). Hawaii's native cotton has been bred with commercial varieties to provide a hybrid that is less susceptible to attack by bollworms, aphids,

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

mealybugs, and scale insects. The potential exists for the use of the native spurge (of the genus Chamaesyce) as a source of natural rubber, and researchers are investigating Hawaii's native raspberry (Hawaiiensis, known in Hawaii as akala) to improve fruit size and transfer its thornless quality to commercial raspberries.

Mr. Chairman, I bring these facts to your attention in an effort to highlight the need for Congress to develop a national program which will assist Hawaii's crusade to preserve its remaining native plant and animal life. Because the loss of native species has been dramatic, passage of legislation to promote the conservation of biological diversity is necessary to halt further depletion of our precious natural biodiversity.

In Hawaii, we see stark examples of both the extreme loss of biodiversity as well as successful efforts to reverse the threat of losses. The Island of Kahoolawe once supported a sizeable Hawaiian community, but sheep and other non-native mammals have destroyed its forests and fires have disrupted the island's ability to support complex ecosystems. Kahoolawe's barren landscape prevents the percolation of rain water and promotes the rapid erosion of its soil. Streams and springs have dried up and the island has largely been reduced to a desert.

In contrast, a success story is in the making at both Hawaii Volcanoes and Haleakala National Parks, where enclosure fencing and judicious management practices designed to encourage diverse native Hawaiian species have reversed the depletion of

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

biodiversity, demonstrating that the policies promoted by H.R. 4338 are feasible and will benefit the ecology of Hawaii.

Unfortunately, despite great vigilance, we are still losing habitats and species in Hawaii. What is equally frightening, however, is the extinction of species not yet discovered by man.

Recent discoveries have uncovered remarkable cave ecosystems in young lava tubes and the existence of wind-supported ecosystems on new lava flows. Prior to their discovery, the islands were thought to be too young and too isolated from other similar habitats to have developed these unique communities. Furthermore, new species have consistently been discovered in nearly every native group studied in detail using modern methods. New trees, new birds, even whole new ecosystems are periodically uncovered in Hawaii.

A growing awareness of our declining biodiversity has spawned a number of initiatives in Hawaii that can serve as models for addressing the problems that H.R. 4335 seeks to remedy. Hawaii is fortunate enough to have an up-to-date inventory of its native higher plant life. Thanks to a project begun in 1982 by the Bishop Museum and now nearing completion, we know that there are about 1,000 plants native to Hawaii.

Projects similar to the Bishop Museum's native plant inventory are in progress to establish an accounting of Hawaii's native insects, birds, algae, and land snails. With additional support from the legislation before you, other essential

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

information about the unique biota of Hawaii can be gathered for inclusion in an interlocking information base that will shed new light on our State's remarkable biodiversity.

All this information on Hawaii and the literature that supports it have been assembled in a vast data base that is consulted continuously by the Nature Conservancy's Natural Heritage Program, the State of Hawaii's Department of Land and Natural Resources, the U.S. Fish and Wildlife Service and the National Park Service. Without this data base these agencies would be forced to operate without a clear understanding of the plant and animal diversity native to Hawaii.

In addition, a collaborative project called the Hawaii Conservation Biology Initiative is also in its earliest stages at this moment. This initiative will involve all federal, state and private institutions with responsibility for conservation of biological resources in a project to provide essential laboratory and field support for Hawaii's effort to maintain its biodiversity. The Nature Conservancy, which will have the lead responsibility in coordinating this initiative, has been awarded a grant from the MacArthur Foundation to begin its work. This is an ambitious undertaking, however, and will require additional support from other funding sources as it proceeds. A Center for Tropical Biodiversity is also in its infant stage. This center, presently housed at Bishop Museum, will act as a clearinghouse, as well as provide data base and management expertise for biological surveys in Hawaii and throughout the Pacific.

Hon. Daniel K. Akaka
Biodiversity Legislation
June 9, 1988

In closing, I do not want to leave this hearing room having understated the urgent need for action on the legislation before you. Without question, the continued loss of biological diversity will have profound consequences for the welfare of mankind. Only recently have we begun to truly appreciate the scope of this problem and its effect on nature's subtle machinery. What we now know should be sufficient to frighten each of us into the realization that conserving biological diversity is nothing short of an ecological imperative for man and his future here on earth.

Thank you.

Mr. SCHEUER. Thank you very much, Congressman Akaka. We're delighted to have you testify here today, and we very much appreciate the quality of your testimony and the commitment to the cause of biological diversity that is quite evident.

I'd like now to yield to my colleague, Congresswoman Claudine Schneider, because she has to leave us pretty soon. So, take whatever time that you may need.

Miss SCHNEIDER. Thank you. I welcome you, Mr. Akaka, and thank you for your expert testimony.

I, too, lament the loss that has occurred in Hawaii, and I think that, as I had said in my opening statement, let us hope that the United States can move as a whole to prevent the further loss of species. But it is sad to note that, as you point out, over 70 percent of the extinctions that have occurred in the United States have occurred in your small State.

I am aware that the Federal Government has expended some dollars for data collection on birds and also the project that was started in 1982 by the Bishop Museum to look at about 1,000 different plants that are native to Hawaii. Are there any other efforts ongoing within Hawaii of this nature?

Mr. AKAKA. Some federal moneys are being spent at this time on fruit flies in Hawaii. As we know, we can identify about 1,000 of them in Hawaii, but there are about four species that have been damaging to agriculture. And the danger here is that, if it ever gets to the continent, it would damage the agricultural industry here.

So, it becomes a huge problem, and we are studying this in Hawaii at the present time with the hope of controlling those fruit flies and keeping it out of the continent.

Miss SCHNEIDER. Have you seen much enthusiasm on the part of those Federal agencies that are working in Hawaii to expand the programs there?

Mr. AKAKA. Yes. There is a desire to do that, and I know that because they've mentioned it to me with the hope that we may be able to appropriate funds to help these projects.

Miss SCHNEIDER. Let me mention that at this moment we have 73 cosponsors of our bill, and certainly the chairman and I would welcome your enthusiastic leadership in assisting us in moving toward collecting more co-sponsors, because we are anxious to move this bill through this year. So, I thank you for—

Mr. SCHEUER. We're not anxious. We're eager.

Miss SCHNEIDER. So, I thank you for your expert testimony, and I look forward to working with you on this legislation.

Mr. AKAKA. Thank you, and I'd be very happy to help you in that way.

Miss SCHNEIDER. Great. Thank you kindly.

Mr. AKAKA. Thank you.

Mr. SCHEUER. Thank you very much, Congressman Akaka, and we look forward to working with you in preparing the hearing in Hawaii for next January.

Mr. AKAKA. Thank you very much, Mr. Chairman.

Mr. SCHEUER. OK. Now we'll hear the first panel, with representatives of the land management agencies. Will the representatives

of the U.S. Forest Service, the National Park Service, and the Bureau of Land Management come to the witness table?

Mr. F. Dale Robertson, Chief, U.S. Forest Service; Dr. Eugene Hester, Associate Director of the National Park Service; and, Roland Robison, Deputy Director of the Bureau of Land Management.

We'll hope to avoid as best we can the confusion between Robertson and Robison. Why don't each of you take 6 or 7 minutes and chat with us informally, hopefully not reading your statement, and then after that I'm sure we'll have some questions for you.

So we'll start out with—let's see. Going from left to right, we'll take Dr. Eugene Hester, Associate Director of the National Park Service.

STATEMENT OF DR. EUGENE HESTER, ASSOCIATE DIRECTOR, NATIONAL PARK SERVICE; F. DALE ROBERTSON, CHIEF, U.S. FOREST SERVICE; AND ROLAND ROBISON, DEPUTY DIRECTOR, BUREAU OF LAND MANAGEMENT, ACCOMPANIED BY DAVID ALMAND, CHIEF OF THE DIVISION OF WILDLIFE AND FISHERIES, BLM

Dr. HESTER. Mr. Chairman, I have a brief statement that I would like to present to you and I appreciate the opportunity to be with your subcommittee with the views of the National Park Service on H.R. 4335.

While we agree that the maintenance of biological diversity is a goal that merits national attention, the National Park Service is already engaged in efforts to protect biological diversity.

In light of these efforts, we believe the program authorizations in the remainder of the bill are not necessary or premature.

We, therefore, oppose enactment of H.R. 4335. In addition to a statement of findings and purposes, H.R. 4335 would establish the conservation of biological diversity as a national goal and require Federal agency actions to be consistent with that goal, amend the National Environmental Policy Act of 1969 to require consideration of impacts of Federal actions on biological diversity and direct the Council on Environmental Quality to establish guidelines.

To establish a national center for biological diversity and environmental research to coordinate—

Dr. SCHEUER. Dr. Hester, why don't you skip to the end of what the bill performs. I've already told them.

Dr. HESTER. By its very existence, our national park system is a testament to this Nation's commitment to preserving biological diversity.

Furthermore, we believe protecting biological diversity is key to the effective conservation of the world's national parks and protected areas.

Federal policy in this regard has already been stated with respect to this Nation's foreign assistance activities. Section 119 of the Foreign Assistance Act of 1961 was amended in 1983 to authorize development of a strategy to protect and conserve biological diversity in developing countries.

The development of a cohesive domestic policy will complement these international efforts. We wholeheartedly support the concept

of Federal interagency coordination of governmental activities and providing leadership for State and private efforts using existing authorities.

Legislation is not necessary to provide for coordination. Government agencies, working in cooperation with the private sector, should be given the opportunity to develop coordinating mechanisms and program recommendations.

Until the need for specific programs has been identified, we believe the establishment of a national center and the National Scientific Advisory Committee and the authorization of a new grant program, would be premature.

I would like to conclude my statement by noting that we are taking action in a number of areas related to the goals of the legislation.

Since the committee held its oversight hearings last September, the National Park Service has taken significant steps to develop new programs relating to biological diversity.

We will soon begin a major education program for full implementation in 1989 to foster public appreciation of the benefits of biological diversity and the specific role of parks and protected areas.

Among the projects will be an automated slide library to enable development of educational programs tailor-made to particular parks, or aspects of the biological diversity issue.

We have begun to work with the Nature Conservancy and various universities in developing automated databases on park biological diversity.

Under an interagency agreement involving conservation, science, and economic development agencies, we expect this summer to begin a coordinated regional effort to maintain biological diversity in the southern Appalachians under the aegis of the Man and the Biosphere Program.

Finally, in May, we cosponsored a symposium and workshop with the National Science Foundation and the Society for Conservation Biology to strengthen the scientific bases for managing park biological diversity.

We are developing our own biological diversity action plan, considering the many recommendations of the symposium. Among them, support for establishing an interagency working committee on biological diversity.

We look forward to working with your committee on behalf of maintaining the Nation's biological heritage. That concludes my statement, Mr. Chairman. I'll be glad to respond to your questions.

[The prepared statement of Dr. Hester follows:]

STATEMENT OF DR. EUGENE HESTER, ASSOCIATE DIRECTOR, NATURAL RESOURCES, NATIONAL PARK SERVICE, DEPARTMENT OF THE INTERIOR, BEFORE THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT, HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, CONCERNING H.R. 4335, THE PROPOSED "NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND ENVIRONMENTAL RESEARCH ACT."

JUNE 9, 1988

Mr. Chairman, I appreciate the opportunity to provide your Subcommittee with the views of the National Park Service on H.R. 4335.

While we agree that maintenance of biological diversity is a goal that merits national attention, the National Park Service is already engaged in efforts to protect biological diversity. In light of these efforts, we believe the program authorizations in the remainder of the bill are not necessary or premature. We therefore oppose enactment of H.R. 4335.

In addition to a statement of findings and purposes, H.R. 4335 would--

- establish the conservation of biological diversity as a national goal and require Federal agency actions to be consistent with that goal;
- amend the National Environmental Policy Act of 1969 to require consideration of impacts of Federal actions on biological diversity, and direct the Council on Environmental Quality to establish guidelines;
- establish a National Center for Biological Diversity and Environmental Research to coordinate and publish research and other information;

- establish an Interagency Working Committee of Federal agencies, including the Bureau of Land Management, Fish and Wildlife Service, and National Park Service of this Department, to coordinate Federal activities and develop a Federal strategy for conservation;
- authorize Federal agencies to make matching grants to public and private entities;
- establish a National Scientific Advisory Committee, a majority of whose members would be appointed by the President from private life, to advise Federal agencies on biological diversity; and
- authorize appropriations of \$5 million in fiscal 1989 and \$10 million for each of fiscal years 1990 and 1991.

Mr. Chairman, by its very existence, our National Park System is a testament to this nation's commitment to preserving biological diversity. Furthermore, we believe protecting biological diversity is key to the effective conservation of the world's national parks and protected areas.

Federal policy in this regard has already been stated with respect to this nation's foreign assistance activities. Section 119 of the Foreign Assistance Act of 1961 was amended in 1983 to authorize development of a strategy to protect and conserve biological diversity in developing countries. The development of a cohesive domestic policy will complement these international efforts.

We wholeheartedly support the concept of Federal interagency coordination of governmental activities and providing leadership for state and private efforts using existing authorities.

Legislation is not necessary to provide for coordination. Government agencies, working in cooperation with the private sector, should be given the opportunity to develop coordinating mechanisms and program recommendations. Until the need for specific programs has been identified, we believe the establishment of the National Center, and the National Scientific Advisory Committee, and the authorization of a new grant program, would be premature.

I would like to conclude my statement by noting that we are taking action in a number of areas related to the goals of the legislation. Since the Committee held its oversight hearings last September, the National Park Service has taken significant steps to develop new programs relating to biological diversity.

We will soon begin a major education program, for full implementation in 1989, to foster public appreciation of the benefits of biological diversity and the specific role of parks and protected areas. Among the projects will be an automated slide library to enable development of educational programs tailor-made to particular parks or aspects of the biological diversity issue.

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Finally, in May, we cosponsored a symposium and workshop with the National Science Foundation and the Society for Conservation

Biology to strengthen the scientific basis for managing park biological diversity. We are developing our own biological diversity action plan considering the many recommendations of the symposium--among them, support for establishing an inter-agency working committee on biological diversity.

We look forward to working with your Committee on behalf of maintaining the nation's biological heritage.

This concludes my prepared remarks, Mr. Chairman. I would be pleased to respond to any questions you may have.

Mr. SCHEUER. Thank you, Dr. Hester. And now we'll hear from Mr. Dale Robertson, Chief of the U.S. Forest Service.

Mr. ROBERTSON. Thank you, Mr. Chairman.

Mr. SCHEUER. Let me just say to take 6 or 7 minutes to sum up, hopefully not reading your statement. Just talking to us as if you were in our living room and, of course, your full prepared statement will be printed in the record at this point.

Mr. ROBERTSON. Thank you. Well, I'd like to just say at the outset that we agree that the conservation of biological diversity is an important both national and international goal.

Mr. SCHEUER. Yeah. Let me say that we all agree on that. Dr. Hester agrees on that. Mr. Robison undoubtedly agrees with that. But we've come beyond—we really have come beyond the point where innocuous platitudes and glittering generalities really are very productive or even appropriate.

What we'd like to know is what have you accomplished. What systems have you put in place to accomplish the goals that we're talking about. Where are we?

I really hope that all of us, we can all save some time this morning. I'll try not to engage in any platitudinous remarks if I can get the same commitment from all of you.

What are we doing, specifically, in a hands-on management program to achieve these goals? What record of accomplishment can you point to that would make this law unnecessary?

Please proceed.

Mr. ROBERTSON. Well, we have some problems with the law so I'd like to express my—

Mr. SCHEUER. Tell us. Very good.

Mr. ROBERTSON. Concerns about some specifics of the bill—

Mr. SCHEUER. That's what you're here for.

Mr. ROBERTSON. OK. First, conservation of biological diversity is a relatively new concept. It's still evolving rather rapidly as new scientific information becomes available.

Much of what is known about biological diversity is still conceptual and theoretical, and is still being debated by the scientific community.

Mr. SCHEUER. Mr. Robertson, I really don't want to interrupt you constantly and I'll try and exercise some self-control, but for you to say that the idea of preserving biological diversity is a new concept, I find mind-boggling.

It may be that you have discovered it recently, but it's been around at least a century. It goes back to the last century.

Please proceed.

Mr. ROBERTSON. Well, I just have to disagree with you, Mr. Chairman. I think the Forest Service probably has as much experience as any organization in the world with our research capability and the management of the national forest, and we have contributed a lot of the basis for not just the concept, but the principles and how you would apply these principles to on-the-ground land management.

And we have a lot of experience in trying to apply that to on-the-ground—

Mr. SCHEUER. Mr. Robertson, I'm not debating that. I am astonished that you are saying that the concept of the desirability of

preserving biological diversity is something new in this world. It's not. It's generations old.

Now, we're here to listen to you tell us what your agency is doing and we haven't—I haven't said a word of criticism of your agency.

But I am flabbergasted to hear you say that the idea of biological diversity and the value of preserving it is something that just—is a concept that just burst in the heavens upon us in the recent days, months, or years.

I don't know when your agency discovered it, but it's an idea that has been time-tested and has been around a long, long, long, long time.

Please proceed.

Mr. ROBERTSON. Let me tell you, you keep coming back to wanting to know what the Forest Service is doing, I want to tell you we're doing some outstanding work in biological diversity, in managing the national forests.

We manage about 8½ percent of the United States as the National Forest System, and biological diversity in maintaining a viability of all the species of plants and animals out on the national forest has been a high priority of our management of these national forests for a long, long time.

Mr. SCHEUER. Well, the idea of preserving biological diversity isn't very new then, is it? You folks have known about it for a long time.

Mr. ROBERTSON. Yes, we have known about it a long time, but the scientific basis, the concepts, the principles that take this from a concept to trying to put it into practice on the ground, and the three of us here representing the land management agencies, we have to be worried about the concepts and the principles, but also we've got to get down to spot X on a piece of federally owned and managed land as to what does that mean.

That is what our concern is about this bill. So we're trying to—I just think that we're trying to put into law some specific legal requirements before, in our opinion, the science has evolved to the point that we can go from these concepts to on-the-ground application.

That is our number one concern with this bill. And, again, I think I speak from experience because we have been at this for I think as long as anyone has been.

In fact, we have a legal requirement under the National Forest Management Act of 1976, that requires diversity of plant and animal communities on the national forests.

And, again, we've had about 10 to 12 years experience in trying to implement that congressional direction on biological diversity in the national forests and I can tell you there is a lot of scientific debate on just how to go about implementing that.

So there are wide differences of opinions about the requirements of the bill, or the act, that we already have requiring biological diversity on the national forests, yet when I compare that one paragraph in the National Forest Management Act which requires us to manage for biological diversity, and then compare that and the problems we're having in trying to sort through that intellectually and also making practical applications of that, and then compare it

with the 15 items that would be addressed by this national strategy, I worry about having a practical workable situation with this bill.

This bill, your bill also puts teeth in implementation of this with modifying the national—or the National Environmental Policy Act by requiring us to look at the impacts on biological diversity as we go about managing this 8½ percent of the United States.

And that's a worthy goal. No one can disagree with that. And we are doing it to the degree that our people on the ground understand the situation and have the knowledge and basis to do that.

But I can tell you, I've got hundreds of lawsuits filed against the Forest Service today charging us with inadequate environmental analysis under the National Environmental Policy Act.

Yet, we're doing the best job we know how to do on that. So in my opinion, H.R. 4335 would cause some real problems for us Federal multiple use land management agencies.

What I believe is we would be looking forward to 5 or 10 years of lawsuits and appeals and case law trying to interpret and put meaning to these rather general and somewhat vague words in places in this bill.

We have to worry about the implementation of this law and we share, again, as you pointed out very well, we all kind of share the same goals, but the three of us sitting here facing you today have to trace that through to what that means in terms of implementation.

I'm not just here taking an ideological opposition to this bill. I'm here to tell you today I worry about the implementation of this.

So where we come out on the bill is we oppose enactment and as the Park Service representative, Dr. Hester, said, we, too, have sufficient legislative direction, in fact, specific direction to manage for biological diversity in the national forests and we would like the opportunity to, again, through experience, try to work that through before we try to get some additional scientific concepts and ideas legislated into law before their time, in my opinion.

So for these reasons, we do not support H.R. 4335.

[The prepared statement of Mr. Robertson follows:]

STATEMENT OF
F. DALE ROBERTSON, CHIEF
FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

Before the
Subcommittee on Natural Resources, Agriculture Research and Environment
Committee on Science, Space, and Technology
United States House of Representatives

Concerning H.R. 4335
"National Biological Diversity Conservation and Environmental Research Act"

June 9, 1988

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

Thank you for this opportunity to testify on H.R. 4335, concerning the development of a national strategy for the conservation of biological diversity. Current programs and existing authorities are adequate to address this important problem. Therefore, we oppose enactment of H.R. 4335 as being unnecessary and duplicative. We also foresee some serious practical problems if we were required to implement H.R. 4335.

We believe that the sharing of knowledge and experience among the involved Federal agencies will be essential to coordinate a national strategy for maintaining biological diversity. Thus, we think the idea of creating an interagency working committee and a scientific advisory committee should be considered within the Administration under existing authorities. We would certainly want to actively participate in the interagency committee if one is formed.

We strongly oppose the proposal in H.R. 4335 to establish an independent National Center for Biological Diversity and Environmental Research. We believe many of the proposed functions of the Center could be effectively carried out with less expense under existing authority by the Federal Coordinating Council for Science, Engineering, and Technology.

H.R. 4335 would authorize additional appropriations for biological diversity grants to States, organizations, and individuals. Instead of authorizing additional appropriations for biological diversity grants, particularly when we are working to reduce the Federal budget deficit, we recommend the use of volunteers and cooperative projects. Volunteers and other cooperators have made substantial contributions to natural resource interpretative services, recreation facility and trail maintenance, and wildlife and fish habitat improvements within the National Forest System. Similar cooperative projects could be conducted with the primary goal of monitoring biological diversity.

During my testimony before this Subcommittee on September 22, 1987, I mentioned some of the basic principles that affect the conservation of biological diversity within forest and rangeland ecosystems. These principles are based on many years of experience in managing the National Forest System and in conducting forestry research.

As I mentioned in September, the National Forest Management Act of 1976 gave the Forest Service a strong and specific mandate to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives."

The National Forest Management Act also requires that we develop comprehensive land management plans for each of the 123 National Forests. The first round of this process is nearing completion. The plans will be revised at least every 15 years or sooner if needed. Our regulations guiding the development of these plans require that the plans provide for diversity of plant and animal communities and tree species consistent with overall multiple-use objectives.

We are attempting to maintain all species on the National Forests within wilderness and non-wilderness areas. Animals with large home ranges cannot be limited to preserve areas. Meanwhile, we must continue to develop new knowledge through research and practice to learn more about the long-term effects of both preservation and the more active types of management.

We are also examining our policies and strategies for conserving biological diversity, and we are developing ways to blend those policies and strategies with other uses and values of the National Forest System. I have asked a group of Forest Service scientists and resource managers to develop and help carry out an action plan. This group, known as the Forest Service Steering Committee on Biological Diversity, is working to ensure that our policies on biological diversity are clearly understood and consistent with legal requirements and the

current level of scientific knowledge. In April, the committee sponsored a regional workshop on biodiversity at Stevens Point, Wisconsin. We are planning additional workshops and a national meeting on biological diversity following the regional workshops. We have developed an information network to assure that state-of-art information is distributed to the National Forests.

Finally, we are enhancing the biodiversity components of current research programs, particularly those related to the health of tropical forests, genetic diversity of trees, and wildlife habitat management.

As you know, Mr. Chairman, the conservation of biological diversity is a major environmental issue, both nationally and internationally. We are committed to the goal of maintaining biological diversity, and we are trying hard to blend this goal into the overall management of the National Forests. The strategy for doing this is still evolving as new scientific knowledge becomes available. However, to be effective and workable, that strategy must be based on concepts, definitions, and other terminology that are scientifically sound and at least reasonably well understood by resource managers and people who are interested in the management of the National Forests.

The concept of "biological diversity" is relatively new and somewhat elusive. The scientific community has not yet agreed on appropriate definitions and other terminology. This basic difficulty is reflected in H.R. 4335.

I would like to highlight three examples of the serious practical problems we foresee if we were required to implement H.R. 4335.

The first example concerns section 5(c). That section would require that "the actions, policies, programs of all Federal agencies shall be consistent with the goal of conservation of biological diversity."

As I said earlier, we are already trying to implement a similar goal on the National Forest System in response to direction in the National Forest Management Act. Biological diversity is a broad concept that should be approached through specific actions that are unique to particular ecosystems in specific areas over specific time periods. The principles of biological diversity should be built into interdisciplinary plans and actions at the local level.

We believe that it would be impractical to implement a national goal such as that in section 5(c) of H.R. 4335, particularly within the context of the broadly worded definitions in section 3 and the complex requirements of other environmental laws and regulations affecting a variety of Federal agencies. To be effective, a national goal or strategy for biological diversity must be woven into the fabric of existing agency missions and legal authorities. Simply overlaying a broad national goal for biological diversity across existing programs seems impractical to us.

The second example deals with section 5(d). Under this provision, the National Environmental Policy Act would be amended to require that all environmental impact statements include an assessment of the "impacts on biological diversity."

While the Forest Service does not currently use the biological diversity terminology in H.R. 4335, our environmental impact statements already address many issues related to the conservation of biological diversity. However, a requirement that NEPA statements specifically address biological diversity in the very broad way that it is defined in H.R. 4335 would subject the NEPA process to many additional appeals and litigation based on the almost unlimited interpretations and meanings of "biological diversity".

If H.R. 4335 were enacted, we foresee being routinely challenged on the perceived inadequacy of our NEPA documentation of biological diversity effects, despite our very best efforts to respond to such a legal requirement. Based upon experience, we can anticipate that those who are opposed to specific federal projects would cite failure to address some aspect of biological diversity as a reason to delay or halt those projects.

The third example relates to section 8. That section would require that the national strategy address 15 items. Unfortunately, from a practical standpoint, there is little scientific knowledge or agreed-upon technology available to address several of the 15 items. Some of the most difficult include item (6) "prevention of anthropogenic biological extinctions" and item

(7) "provisions for the continued functioning of ecosystem processes". Again, we think it is essential to recognize the very real limits of current scientific knowledge and practice. A meaningful response to several of the 15 items would require data supplied by long-term monitoring and evaluation.

From a broader perspective, modern agriculture is built upon a foundation of biological diversity. Genes from wild species, landraces, and primitive cultivars have been used to develop the high-yielding crops that enabled us to feed the world's ever increasing population. Collections such as the rice of the International Rice Research Institute in the Phillipines, corn and wheat at the Centro Internacional de Mejoramiento de Maiz y Trigo in Mexico, potato at the Centro Internacional de la Papa in Peru, and the many crops of the U.S. National Plant Germplasm System are crucial to the support of agriculture in this Nation and around the world. While the number of species involved is only a small fraction of the total, the role they play in support of modern society is pivotal. It is, therefore, essential that we acknowledge the importance of these resources and the critical need to insure their conservation both as wild species in in-situ reserves and as accessions in ex-situ gene banks.

In summary, Mr. Chairman, we oppose enactment of H.R. 4335, because many of the objectives of the bill are already being met under existing authority, the bill would create unnecessary and duplicative coordinating mechanisms, and the bill would likely subject the NEPA process to many additional appeals and litigation.

I will be happy to respond to your questions.

January 6, 1988

Forest Service Briefing Paper
FY 1988

- Topic: Challenge Grant Program in Wildlife and Fisheries Habitat Management
- Issue: Across the nation, people are catching the Challenge Grant spirit. Conservation groups, private individuals, and public agencies are forming partnerships with the Forest Service to improve habitat for our nation's wildlife and fisheries resources.
- Discussion: In FY 1986, Congress appropriated \$950,000 to the Forest Service wildlife and fish management program for a Challenge Grant program. These funds were specified in the Continuing Resolution to be primarily used for habitat improvement in the National Forest System in coordination with matching funds from States, other Federal agencies, and conservation groups. These funds were allocated to all 9 Regions of the Forest Service. A total of 104 projects were completed in cooperation with more than 25 agencies and groups.

The response from the National Forests has been outstanding. Over \$1,600,000 was contributed by cooperators in a variety of wildlife, warm and cold water fish, threatened and endangered species, and anadromous fish habitat improvement projects. Conservation organizations are coming to the Forest Service asking how they can be involved in the Program.

In FY 1987, Congress allocated \$1,500,000 for the Challenge Grant Program. Once again, these funds were distributed to all Forest Service Regions. Over 200 cooperators provided more than \$2,600,000 in habitat improvement projects!

Examples of habitat improvement which have been accomplished are: prescribed burning to increase the carrying capacity of elk winter range; constructing guzzlers to provide water for quail and other wildlife; placement of boulders and logs in streams to improve feeding habitat and provide cover; installation of brush in lakes to provide cover for fish; introduction of peregrine falcons at hack sites; and removing stream obstructions to allow the passage of migratory salmon.

Challenge Grant projects have improved the cooperative spirit of conducting National Forest System management. This program has turned some adversarial conservation organizations into positive, productive partners, and at the same time provided what the customers wanted--healthy wildlife and fish populations.

Challenge Grant Briefing-page 2

Congress increased the Challenge Grant appropriation to \$2,000,000 in FY 1988. Information on the success this program is having in habitat improvement, and in a partnership spirit, is evidently being transferred to elected officials in Congress.

Opportunities: We estimate that there are over \$13,000,000 in projects available for initiation and completion in FY 1989. Many local sportsman's clubs, and local and National conservation organizations are coming to the Forest Service at the Ranger District and Forest level asking about developing a cooperative Challenge Grant program. Some National groups, such as Trout Unlimited and the Rocky Mountain Elk Foundation have developed national Memorandums of Understanding with the Forest Service to encourage their local organizations to develop Challenge Grant programs.

"JOIN US", a brochure which describes the Challenge Grant Program will be available for distribution throughout the country in mid-January. This publication was developed with the Wildlife Management Institute and is intended to increase the awareness of agencies and organizations in opportunities for cooperation in habitat improvement activities in the National Forest System. -

Contact: Karl Siderits, WO--WL/F

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Mr. SCHEUER. Thank you very much, Mr. Robertson. That was very interesting testimony. All right. Now we'll hear from Mr. Roland Robison, Deputy Director of the Bureau of Land Management.

Please take your 7 or 8 minutes, or such time as you may need, and after that we'll have questions for the three of you.

Mr. ROBISON. Mr. Chairman, my platitudinous speech, if you will, has already been entered into the record and I would follow your advice and say a few words in my own words with respect to the concerns that we have with this particular piece of legislation.

Mr. SCHEUER. Excellent.

Mr. ROBISON. The BLM, as I'm sure you know, manages about 270 million acres of land, largely located in the west. Our mandate under the national organic act that governs our activities requires that we manage those lands for multiple use purposes, which means that we not only manage them for wildlife and concerns that we're addressing here in this legislation, but we manage them for livestock grazing, for oil and gas development, for coal development, for recreation, watershed, and so on.

So we're frequently in a situation where we're tugged and pulled to pay attention to one group as opposed to another group, as you can appreciate.

In order for us to face up to that particular task that we have, we have adopted a planning process which causes us to pay attention to all of those acres that are under our control.

And we develop plans which cause us to manage the lands in a way that takes into account the various concerns that are before us. We hope that we're adequately addressing not only grazing and oil and gas development, recreation, but also those things that relate to endangered species and diversity of species and those kinds of things.

I would say to you that at least that is a part of our purpose, it's a part of our charge and that's what we do in fact, attempt to do. We are guided by the National Environmental Policy Act. We're guided by the Endangered Species Act. We're guided by other acts that cause us to focus on the particular concerns that are related to this bill and we think, Mr. Chairman, that we're doing that in adequate fashion.

If I might, I'd just like to draw your attention to some of the things specifically that we are doing. We have been concerned in the West with the desert tortoise and we have addressed our efforts and concerns to the rehabilitation of that particular species which is threatened. We have engaged in considerable activities that would cause reintroduction of bighorn sheep in areas where they once lived but have since vanished.

We're concerned with protecting rare plant resources through site-specific designations of areas of critical environmental concern. That's a designation that causes us to pay particular attention to species found within the confines of an area so designated. We've set aside thus far about 5-million acres in these areas of critical environmental concern and we have about 255 of them. You're aware of course, of the Wilderness Act and we are proceeding to go through the process that will cause us eventually to designate considerable acreage in the West under BLM management in these

kinds of protected areas, which of course would lend itself to protection of the kind that you're suggesting here.

We have worked closely with other agencies and those that are represented here at this table in protection and management of habitat for grizzly bears, for bald eagles, for peregrine falcons, for elk, for antelope, deer, waterfowl, raptors, et cetera.

We have this charge. We have this responsibility and as it relates to the public lands, we're very serious about carrying it out, and I would say to you that I think that we're appropriately addressing these concerns. Now let me say something that ties in with what the Chief of the Forest Service just said.

It is a difficult job, an extremely difficult job, to manage the public lands because of the tugs and pulls that I've already referred to, because of the many kinds of activities that take place and because of the controversy that always occurs with respect to the management of these lands. We find ourselves constantly before the courts in lawsuits because one group or another doesn't agree with the kind of management that we're giving and, as you well know, there's no way in the world we could satisfy all of our critics.

We're concerned that the imposition now of another layer of rules and regulations that we have to comply with, that are somewhat undefined and vague, if you will, only holds us open for more lawsuits, more difficulties, more frustrations in trying to carry out our job.

We would say to you, go slow. Be careful. Be cautious. Because these kinds of things may make it very difficult for us to perform the jobs that we've been given and we would say that you should, if you can, devote more attention to supporting us in the activities that we're presently carrying on. I think Mr. Chairman, that's the crux of my statement. Thank you for your attention.

[The prepared statement of Mr. Robison follows:]

JUN -9 1988

STATEMENT OF ROLAND G. ROBISON, DEPUTY DIRECTOR, BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR, BEFORE THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT, COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY, UNITED STATES HOUSE OF REPRESENTATIVES, ON H.R. 4335, A BILL ENTITLED THE "NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND ENVIRONMENTAL RESEARCH ACT".

I appreciate the opportunity to appear here today to discuss how the Bureau of Land Management handles the matters relating to biological diversity that are included in H.R. 4335.

The underlying objectives of this bill are already being met. Therefore, we oppose H.R. 4335 because it is duplicative and unnecessary.

H.R. 4335 would establish a national policy for conserving biological diversity; provide for environmental research and training; establish mechanism for coordinating and carrying out this national policy; and facilitate information gathering and utilization.

In section 2, Congress would find biological diversity a valuable asset that is rapidly being reduced, largely by human activities, and that existing laws and information, are inadequate. Section 4 lists the purposes of H.R. 4335.

These are:

- assess effects of major Federal actions on biological diversity;
- establish a Federal strategy;
- establish mechanism for Federal, State and private coordination;

- collect and process information to understand biological diversity;
- support basic environmental research; and
- educate on importance of biological diversity.

Section 5 would establish biological diversity as a national goal and require that Federal programs be consistent with that goal. The National Environmental Policy Act (NEPA) would be amended by section 5(d), to require that statements by responsible officials include comments on impacts to biological diversity in every recommendation or report for legislation, or other major federal action affecting the environment. Section 5(e) would require the Council on Environmental Quality (CEQ) to establish guidelines for considering biological diversity in the preparation of EIS's. CEQ would also be required to identify biotic communities, species and populations that appear to be in decline or in imminent danger of loss of viability, or are otherwise of "special concern". This information would be required in an annual report.

A National Center for Biological Diversity and Environmental Research (Center) would be established under section 6(a). The Center's primary purpose would be to set national priorities and provide leadership and coordination for understanding and promotion of knowledge of this biological area. Section 6(b) would prescribe the specific functions of the Center, while section 6(c) would establish the structure and membership of the Center. The governing board would be composed of 9 members, selected by the President, from various

scientific institutes, private organizations, the Fish and Wildlife Service, and the National Marine Fisheries Institute. The bill would provide for a Director and staff for the Center; allow the procuring of services of experts and consultants; and acceptance and use of gifts.

Section 7(a) would establish an Interagency Working Committee on Biological Diversity (Interagency Committee). Committee membership would be composed of 8 representatives of Federal agencies to be chaired by the representative from CEQ. The committee's functions would be to coordinate Federal activities for conservation of diversity and prepare and implement a Federal strategy.

Section 8, would require the strategy to address interagency responsibilities, non-Federal sector coordination and numerous implementation criteria. The Interagency Committee would be directed to submit a progress report to Congress within 1 year, and a completed strategy report within 2 years.

Pursuant to section 9(a), each agency would be authorized to make matching fund grants to various agencies and organizations. Further, under section 9(b), each agency would be required to give high priority to research and training, and conduct assessments of its environmental research and training programs for adequacy.

Section 10 would establish a permanent National Scientific Advisory Committee on Biological Diversity (Scientific Advisory Committee). Membership would be composed of 15 persons, including 12 scientists and one representative each from the governing board of the Center, the Smithsonian Institute and the Director of the Center. The function of this committee would be to coordinate

the interactions between the Interagency Committee and the Center, and, provide scientific and technical review of progress relating to conservation of biological diversity.

Section 11 would authorize appropriations of \$25 million over a 3-year period. Expenditures for grants could not exceed 10 percent of the total appropriation for each fiscal year. Appropriations under this bill would be in addition to sums authorized under other Acts.

More specifically, H.R. 4335 would repeat requirements of the National Environmental Policy Act to look at the effect of major Federal actions upon the total environment. It would also require many of the same types of actions to protect the habitat of rare or endangered species as does the Endangered Species Act. The Wilderness Act was expressly written to protect areas in their natural condition.

Many states are establishing a Natural Area program. For instance, the State of Montana has made a commitment to just such a program and identified as its compelling reasons for establishing Montana's natural area system: (1) preservation of the state's biological diversity in a systematic manner and (2) for land management research and education.

BLM is actively involved in the Natural Areas program that is being established in many states. This is graphic evidence of our commitment to the objectives of H.R. 4335.

Research Natural Areas have been established by BLM administratively on thousands of acres of public land to protect representative habitats from development so that they remain available for study and research.

The Federal Land Policy and Management Act directs consideration of all resources and resource use in a comprehensive planning process and in agency decision making.

BLM has the authority and mechanisms in place to carry out the intent of H.R. 4335 and is currently doing so. BLM is implementing a strategic plan for its wildlife and fisheries program which includes among other things, goals to protect and maintain representative and rare plant communities. This is also being done for animals, plants and ecosystems as required in the Endangered Species Act. Our recent emphasis on protection and management of riparian areas also contributes to the overall conservation of biological diversity.

We have been, and continue to be, deeply involved in programs to maintain the variety and variability of fish, wildlife and plant resources on public lands. Examples of this involvement include:

- comprehensive planning and coordination to further develop and implement on-the-ground management to ensure the continued viability of the desert tortoise and the ecosystem on which it depends;
- extensive management and cooperative programs that have restored a variety of species, including the desert bighorn sheep, to many parts of their historic range;

- protecting rare plant resources through site specific designations of areas of critical environmental concern and restoration programs geared to repropagation of some plant species;
- extensive interagency involvement to protect and manage grizzly bears, bald eagles, peregrine falcons, and their habitats.
- extensive on-the-ground management of various wildlife species, such as elk, antelope, deer, waterfowl, and raptors through over 200 wildlife management plans.

The Land Information System (LIS) being developed by BLM has the potential to provide the type of data management system necessary to ensure efficient implementation of this policy. Its effectiveness would depend on the criteria developed for carrying out the biological diversity objectives.

All of the programs I have mentioned are the types of activities that under H.R. 4335 would be carried out by the newly established organizations -- National Center for Biological Diversity and Environmental Research, a Scientific Advisory Committee and an Interagency Working Committee on Biological Diversity -- at a cost of at least 25 million dollars over the next 3 years and potentially more as the bureaucracy evolves.

In summary, the purposes of H.R. 4335 are already being carried out on public lands in the United States. Even the functions of the Interagency Working Committee on Biological Diversity can be accomplished under existing

authority, such as by Memorandum of Understanding among concerned agencies. Establishment of a committee by law is not necessary.

Although we support the objective of promoting biological diversity, we believe the bill should place the responsibilities for the program it espouses on the land management agencies that currently have the responsibility for managing the Federal lands and their resources.

Imposing additional strata of management of biological diversity, as this bill proposes, would only fragment responsibility for sound land management and create confusion and waste. Additional statutory direction can only lead to duplicative effort and a prolonged period of inventory, analysis and potential litigation relating to undefined terms, issues and responsibilities.

This concludes my prepared statement. I will be pleased to answer any questions.

Mr. SCHEUER. Thank you very much, Mr. Robison. Mr. Robison, I understand that the BLM requested Alan Cooperrider of the Denver office to study BLM's programs to conserve biological diversity. He made a number of recommendations in September of last year. They're intriguing. He recommended that you retain outside scientific consultants.

He recommended you coordinate your activities with other agencies. He recommended that you develop a policy on biological diversity. He recommended that you identify and monitor biological diversity. And he recommended that you commence in-house education and training.

Can you tell us what progress you've made in implementing these recommendations in the 8 months since the report was made?

—Mr. ROBISON. I am generally familiar with the report, Mr. Chairman. That report has been looked at and studied by our particular branch concerned with that activity. There is a representative of that.

Mr. SCHEUER. But what do you mean by the particular branch? It seems to me these are a set of policy recommendations and program recommendations that go to the very essence of the BLM's function. Wouldn't that get to a person like you who's a Deputy Director of BLM?

Mr. ROBISON. Well, it would ultimately, after appropriate review by people who are more specifically concerned with it than I.

Mr. SCHEUER. So in 8 months, it hasn't come to your attention yet?

Mr. ROBISON. I've got to say that I have not been personally involved in that. I would say that we do have somebody here from our Wildlife—

Mr. SCHEUER. Well why don't you tell us which of these things you've responded to in the 8 months, I don't mean you personally, which of these program recommendations has BLM adopted in the 8 months?

Mr. ROBISON. Mr. Scheuer. I cannot respond to that. I do not know. I would be happy to supply it for the record but I do not know the answer.

[Material supplied for the record by BLM, see appendix, p. 408.]

Mr. SCHEUER. All right. Can this gentleman testify with us?

Mr. ROBISON. Mr. Chairman. If, with your permission, Mr. Almand, Mr. David Almand of our staff could respond to your question.

Mr. SCHEUER. By all means.

Mr. ALMAND. Mr. Chairman. The project to which you refer—

Mr. SCHEUER. Could you pull the mike up a little closer please.

Mr. ALMAND. Mr. Chairman, the project to which you refer that Mr. Cooperrider was involved in is a project he was actually working on in conjunction with our staff. It was a result of an assignment to him and our staff at the—wildlife staff—at the Denver Service Center, coming out of—

Mr. SCHEUER. Well, he's a member of your staff, is he not? No, I guess he's an—he's a member of your Denver office?

Mr. ALMAND. That is correct. Our Denver service center.

Mr. SCHEUER. Right.

Mr. ALMAND. And we work in close concert with that staff. We being my staff and I and—but every year, we—

Mr. SCHEUER. Now wait a minute. Tell me what is your staff and—

Mr. ALMAND. OK, I'm—Sir, I'm chief of the Division of Wildlife and Fisheries and I have a small group that serves as partners with me here in the Washington office to sort of provide leadership.

Mr. SCHEUER. OK.

Mr. ALMAND. Anyway, the project—

Mr. SCHEUER. So what has been the history of the implementation of Mr. Cooperrider's recommendations?

Mr. ALMAND. We're trying to figure that out right now. He has done some groundbreaking work for us. Made some recommendations and we're in the process of analyzing those and trying to move forward and follow-up to a few of them. We have no specific—

Mr. SCHEUER. Now wait a minute. Say that again?

Mr. ALMAND. He has made some specific recommendations and so on. As a result of his project, we're in the process of analyzing those and moving forward to try to follow-up on a few of them. We have not developed a complete action plan yet. Before we can move forward, it's necessary for me and my staff to brief Mr. Robison and other officials in the Bureau. So, what I'm saying to you is that—by way of explanation is that the work, the staff work, is incomplete at this time and I'm not yet fully prepared to brief my superior on exactly what course of action in the way of a follow-up we would recommend that they buy off on. We hope to be doing that shortly.

We have a good bit of effort devoted to biological diversity because we are wanting to try to get out in front of this issue as Mr. Robison said; we do have responsibility here and I view it as part of my responsibility to recommend to him and others the kind of steps and actions that we should be taking and that's what we're trying to get up to speed to do.

Mr. SCHEUER. Well, you know, that's a lot of language that we've heard in the last 30 or 60 seconds. What have you done since last September when Mr. Alan Cooperrider recommended to you that you take advantage of outside scientific consultants, that you begin some coordination with your colleagues here in the agencies that they represent, that you develop a policy on biological diversity? That you develop a policy on biological diversity which you apparently don't have. That you commence identification and monitoring of biological diversity within the land area which you control under BLM. And that you commence in-house education and training on the subject of biological diversity and its preservation. Have you come to any conclusions about the validity of any of these rather simple, declarative recommendations?

Mr. ALMAND. Yes sir, we have. We think some of them have a lot of merit. We have a meeting scheduled a little later this year in which we will be consulting—a member of my staff will be consulting with some of these outside folks.

We're going to be talking about the kinds of things that we ought to be doing and sort of doing some brainstorming. So we've already moved—taken action to sort of follow-up on——

Mr. SCHEUER. Well, I don't understand the action you've taken. On any of these recommendations.

Mr. ALMAND. We've scheduled a meeting. I do not remember the precise——

Mr. SCHEUER. When is the meeting scheduled for? When is the meeting scheduled for?

Mr. ALMAND. I. Excuse me, just one minute. August, sir.

Mr. SCHEUER. So it took you 11 months to come to the point of scheduling a meeting on these recommendations?

Mr. ALMAND. Well, that's not quite that long, sir.

Mr. SCHEUER. It's 11 months. *He submitted the report in September.* You're going to meet on that report in August of the following year.

Mr. ALMAND. Well, we have been sitting in on other meetings and having discussions informally with a number of groups and individuals on what biological diversity is, the kinds of things we ought to be doing. You know? What we ought to be doing to try to get a little better fix on that. We've also, in the arena of training——

Mr. SCHEUER. You haven't had a chance to brief Mr. Robison or the Director of your agency in 8 or 9 months?

Mr. ALMAND. Well, I guess sir, we probably had a chance, but I'm at fault for not having taken the initiative to do that because I did not feel comfortable enough with all the information I had right now to go forward with such a briefing.

I felt I needed to do a little more staff work because I just wasn't ready to lay out the kinds of things we think we ought to be doing. We have——

Mr. SCHEUER. Mr. Alan Cooperrider is not a hostile outside force. He's a member of your own staff.

Mr. ALMAND. Not on——

Mr. SCHEUER. Pardon?

Mr. ALMAND. No sir, he's not a member of my——

Mr. SCHEUER. Well, he's a member of the BLM staff, let us say, he's the family of BLM. OK? He's not an alien intruder from outer space.

Mr. ALMAND. No, sir, he's one of our outstanding workers.

Mr. SCHEUER. Great. Have you had a chance to talk to him personally about his recommendations?

Mr. ALMAND. No, sir. But we will be meeting with that staff the first week in July.

Mr. SCHEUER. That's in August?

Mr. ALMAND. No sir. We will have a coordination——

Mr. SCHEUER. Then it took you 10 months to meet with the staff——

Mr. ALMAND. Yes sir and this will be one of the issues that we'll be talking about, the follow-up, the progress that had been made on some of those prior projects that we've agreed to be done. Sir, if I could, relate what we're planning with training, or at least what we're exploring.

We have had discussions with officials of our Phoenix Training Center about establishing some sort of training course or courses on biological diversity and I do not wish to try to sound evasive or muddy the water or not answer your questions. The situation is that we are trying in a very sound professional manner to deal with what is a sort of a challenging concept and trying to move forward with and to lay out a really responsible course of action that we can take pride in and so on.

Mr. SCHEUER. Well we hope very much that you'll do that. Let me ask you. Have you put you Phoenix people in touch with your Denver people?

Mr. ALMAND. Yes, sir. They will be meeting with us—

Mr. SCHEUER. Has Mr. Cooperrider met with your people in your Phoenix office who are contemplating developing an in-house training program?

Mr. ALMAND. There have been discussions involving him, yes.

Mr. SCHEUER. With Mr. Cooperrider?

Mr. ALMAND. And others.

Mr. SCHEUER. They've talked to Mr. Cooperrider and others. Can you tell us anything about the plans that they're contemplating?

Mr. ALMAND. I'm sorry, I didn't get the last question?

Mr. SCHEUER. Here 8 months later, Mr. Cooperrider has met with the folks in Phoenix who have been charged by you as I understand it with developing an in-house training program.

Mr. ALMAND. A member of my staff has met with the people in the training center. There's a very close partnership and communication that does involve Mr. Cooperrider. Yes, sir.

Mr. SCHEUER. And has anything resulted from that in terms of designing an in-house training program?

Mr. ALMAND. Yes, sir; efforts are underway toward that end. We do not have a specific training course or courses set up yet, but we're trying to figure out precisely what they will be and we're hoping to have at least one that may go into operation next fiscal year.

Mr. SCHEUER. Well. That's encouraging. Now, how about the business of retaining outside scientific consultants? Have any steps been made to find out who Alan Cooperrider had in mind and as to what kind of scientific outside consultancy would be helpful in, let us say, developing a policy on biological diversity?

Identification and monitoring—and how you set up an identification and monitoring program of biological diversity within the land over which you have control?

Mr. ALMAND. Yes, sir. We could provide that specific information I think, if perhaps, for the record, with names, or something.

Mr. ROBISON. Mr. Scheuer, if I might. Our position is that an individual was commissioned to make a study. He has reported back to us. That study is being analyzed within the framework of our organization. We intend to approach that after the analysis is completed and make some positive decisions with respect to how we then want to proceed.

My experience in government isn't that when a study is commissioned, it's acted upon overnight. It simply doesn't happen that way.

Mr. SCHEUER. Well, overnight isn't 8 months. You haven't met with this chap yet. The first meeting that you planned with him on the subject is apparently in August. Eleven months after the fact. The fact is that the destruction of biological diversity is going on at a horrendous pace. The momentum is gathering and it's a project—it's a problem and a challenge that it seems to me ought to be met with some sense of urgency, Mr. Robison. I don't see any sense of urgency. None whatsoever in the way in which you folks have fiddle-faddled around with this report for close to a year without having done a single bloody thing about it as far as I can see. Now is that unfair criticism?

Mr. ROBISON. Yes, I think it's an absolutely unfair criticism.

Mr. SCHEUER. Well, tell us what you've done. Tell us what you have done.

Mr. ROBISON. The report has been submitted. It has been made available—

Mr. SCHEUER. It was submitted last September, Mr. Robison.

Mr. ALMAND. Then I'll—the report was submitted last November?

Mr. SCHEUER. September.

Mr. ALMAND. In the fall, September.

Mr. SCHEUER. Yeah.

Mr. ROBISON. That report has been made available to Mr. Almand, to his people. They are a professional staff. They have analyzed that or are in the process of analyzing it and they are to present to the management team options as to how we might then proceed. Now it's a deliberate process. It's one that requires consideration, study, consultation, the bringing into play of people who are experts in the field, and that's the kind of process that we go through.

Mr. SCHEUER. But he recommended that you bring into play people who are experts in the field. That's the substance of his recommendations. That you need outside help and that you ought to get outside help to develop a policy on biological diversity. So you're now considering, you're asking outside efforts on deciding whether you ought to retain outside experts.

Mr. ALMAND. Oh no. If that was the impression I left, I didn't mean to leave it at all. I'm saying that our people within the Bureau of Land Management who have responsibility for operation in this area, are considering how we should proceed, having looked at that report, and are going to present to us an action plan.

Mr. SCHEUER. My staff tells me that's a five-page report. And you've spent 8 or 9 months considering how you should proceed on a five-page report? Look, I want to cut this short. I don't know where this is getting us. But frankly, Mr. Robison, your testimony, is eloquent and far more eloquent than anything I could say as to the justification of this legislation. What you have described as your accomplishments with the bighorn sheep and so forth as the best example of the work of the Bureau of Land Management indicates that you don't have any comprehensive plan to maintain biological diversity. You've indicated a few piecemeal, uncoordinated, ad hoc efforts, last-ditch efforts to save species that are already perilously endangered.

As for any comprehensive understanding of the subject, comprehensive willingness, initiatives to reach out and do something about a simple, declarative five-page report, I see none of that. None of it whatsoever.

Let me interject another comment at this point that is reflective of attitude. We requested comments from these three agencies on April 26. A reply was requested by June 1, a little over a month. We haven't received any comments from you on this legislation. Any of these three agencies. Zip. And then formal invitations for you to appear as witnesses were sent May 20, after we had already telephoned.

We asked for your testimony two days in advance of the hearing so that we would have a chance to study it. We received the Park Service testimony last night at 5 p.m., the Forest Service testimony last night at 7 p.m., and the BLM testimony this morning.

So we did not have a chance really to engage in the kind of thorough review of your testimony that the—the order of magnitude of the problem deserves and that, frankly, we think we deserve. You know? We're part of the Government process and you come up here and give us of your wisdom. We'd like to have a chance to answer it so that we can ask you thoughtful, incisive, well-conceived questions. You really don't make that possible when you deliver your testimony after the close of business on the day before, two of you, and the third came in this morning, just before the hearing.

I haven't seen any of them. I have to express regret on that and—it's a small matter perhaps, but perhaps it's a significant part of the larger picture.

Mr. SCHEUER. Mr. Robison. You say BLM has a program to inventory biological resources in its land. What percentage of BLM land has been inventoried for its biological resources?

Mr. ROBISON. I cannot tell you that, Mr. Scheuer. I would be happy to submit that information for the record.

Mr. SCHEUER. What would you say if I suggested it's in the neighborhood of 10 percent? Would you have a reaction?

Mr. ROBISON. I could not—

Mr. SCHEUER. Excuse me. I'm asking you, either you or your consultant. Excuse me. Tell me your name again, for the record?

Mr. ALMAND. David Almand.

Mr. SCHEUER. David Almand. Mr. Almand? Would you be inclined to object if I said that our information is it's about 10 percent of your land that's been surveyed so far for biological diversity?

Mr. ALMAND. Well, it depends upon what we call biological diversity.

Mr. SCHEUER. Just an inventory of the biological resources of BLM lands.

Mr. ALMAND. Biological resources. I guess my inclination would be that would be a conservative figure. But I would need to put a little more thought into that and—

Mr. SCHEUER. As to what biological resources really means?

Mr. ALMAND. I know what they mean, but I'm not sure they mean the same thing to you from the standpoint of our Wildlife

and Fisheries, I think that is conservative. But for the other biological resources, I can't really speak to at this point.

Mr. SCHEUER. Well, Mr. Robison can't speak. You can't speak. Is there anybody at BLM who can speak?

Mr. ROBISON. Well, you're asking us to verify the 10% figure—

Mr. SCHEUER. No. No. No. Give us your own figure. We'll accept what you tell us.

Mr. ROBISON. I referred earlier to the fact that we've gone through an extensive process to develop land use, if you will, plans, for all of our—the lands under our jurisdiction. We've been going through that process now for a number of years. There are—

Mr. SCHEUER. Well, what percentage of the land—

Mr. ROBISON. There are—

Mr. SCHEUER. Excuse me, Mr. Robison, what percentage of the land under your jurisdiction have you inventoried, have you scrutinized, have you studied?

Mr. ROBISON. Practically all of the land is covered by a resource management plan or a predecessor to that plan which was developed earlier and which we are now trying to replace with resource management plans. That's all being done according to a schedule and it takes some time, but there are plans that cover practically all of our acreage.

Those plans have to take into account concerns relating to wildlife, to fish, to the flora, the fauna. Now I wouldn't want to represent to you that those constitute detailed—looking into precise matters relating to the biology, because they don't.

Mr. SCHEUER. But that's what you're apparently have set as your own mission. You have established a program to inventory biological resources on your lands and I'm simply asking you, what percentage of your land has been subject to that kind of an inventory. I would further ask you, how is the inventory being coordinated with other Federal and non-Federal efforts also to inventory biological resources and whatever state of emergency there may or may not be in biological diversity. Have you consulted with either of your two sister agencies here?

Mr. ROBISON. We consult generally and frequently with the Forest Service, with the Park Service. We give them opportunities to comment on the plans that we develop. We go through a public participation process. So, with respect to our plans, yes, we are in consultation with the other agencies.

Mr. SCHEUER. Mr. Robison, Dr. Campbell of the National Resources Defense Council is going to testify later that BLM is not using its areas of critical environmental concern, the ACEC Program, systematically to identify areas of biological diversity. Would you have any response to that criticism?

Mr. ROBISON. Well, I honestly think that we're doing a rather good job in establishing ACECs and developing plans for their management. The ACEC program is one that isn't completely completed at this time. It's one that evolves from our planning process.

Mr. SCHEUER. Well now, let's talk about ACEC for a bit. Has the BLM State director in Nevada issued a policy not to designate areas of critical environmental concern for wildlife habitat?

Mr. ROBISON. I'm not aware that he has.

Mr. SCHEUER. Pardon?

Mr. ROBISON. I'm not aware that he has.

Mr. SCHEUER. OK. Why has the BLM in Colorado refused to designate as areas of critical environmental concern dozens of areas identified by the State's natural area programs?

Mr. ROBISON. Well, I can only respond that we have ACECs in Colorado. We've got them in most of our states. They, as I indicated earlier, they cover about 5 million acres and they're scattered throughout the West. Some of them are established for some purposes. Some are established for other purposes and again I would suppose that we don't always do all of the things that people who criticize us want us to do.

Mr. SCHEUER. No. No. I'm talking about things that your own legislation and your own program require you to do. Let me ask how the BLM biological database is linked with the databases of other Federal, State, and private institutions including your two sister agencies here.

Mr. ROBISON. How was our database linked to theirs?

Mr. SCHEUER. Yes. Um-huh.

Mr. ROBISON. Well, BLM goes through its planning process and invites comment from other agencies that are concerned, including state agencies. We—I guess that's my response.

Mr. SCHEUER. Mr. Robison. In your view, does the National Environmental Policy Act require your agency to discuss adverse impacts on biological diversity in environmental impact statements?

Mr. ROBISON. If—yes, I would think if there are adverse impacts that would be visited upon creatures or whatever in that area, that—

Mr. SCHEUER. On biological diversity.

Mr. ROBISON. We would be, we should address that.

Mr. SCHEUER. All right. Then this bill wouldn't change your legal responsibilities or your proper responsibilities in that respect at all, would it?

Mr. ROBISON. I would think that we've got that obligation.

Mr. SCHEUER. All right. Then why you oppose this bill, at least in that respect, wouldn't change things at all. You'd think you ought to do it and the bill would require you to do it.

Mr. ROBISON. Well—

Mr. SCHEUER. Any problem there?

Mr. ROBISON. I've indicated, we again don't oppose the purposes for which this bill is drafted. We're concerned about another layer of regulation, another layer of law that has to be complied with, the planting of new seeds for more lawsuits. That kind of thing. Activity that delays and frustrates when we're not sure that it's necessary.

Mr. SCHEUER. Can I ask each of the two other witnesses, Mr. Robertson and Dr. Hester. Does the National Environmental Policy Act, in your opinion, require your two agencies to discuss the adverse impacts on biological diversity in environmental impact statements?

Mr. ROBERTSON. I believe the National Environmental Policy Act requires us to look when we propose a specific action, what the impacts that would be on the streams, the water, the air, the fish and the wildlife and when you add that all up, it's at least a part of biological diversity but this again, biological diversity as a specific

item that you address the impact is just now coming into the forefront and I think that's something that we need to start incorporating in those in total, rather than just piece by piece.

Mr. SCHEUER. So you think they should be addressed in Environmental Impact Statements.

Mr. ROBERTSON. Yes.

Mr. SCHEUER. So the requirement to do that that would be in our legislation wouldn't be an untoward requirement from your point of view?

Mr. ROBERTSON. Yes it would from my point of view.

Mr. SCHEUER. Well, if you think you ought to be doing it and this legislation would require you to do something that you've just told us you think ought to be done, where's the problem?

Mr. ROBERTSON. I'm concerned about the 15 items and how it's described in this bill and going beyond what I believe we're doing now. I know it's going beyond what we're doing now and I believe it's going beyond what we have the scientific basis, or the know-how to do. Now I have no disagreement that those are important items and that we ought to address them. But I'm telling you from a practical experience standpoint, the publics that are involved with us and us, have different interpretations of what it takes to be adequate coverage of these.

That's what we're getting lawsuits and appeals on and that is my real concern.

Mr. SCHEUER. Well, why don't you give us the benefit of your expertise and tell us how our language could be sharpened or perhaps modified so that you'd feel comfortable living with it. You know, this bill wasn't delivered on tablets from Mt. Sinai. It's a human effort and maybe we're fallible. The purpose of a hearing like this is to set in motion a process by which we can benefit from your expertise.

Why don't you respond and give us some positive, constructive suggestions as to how we might alter some of this language to make it more comfortable for you to live with.

Mr. ROBERTSON. Yes. We'd be happy to do that.

Mr. SCHEUER. Good. I would invite Mr. Robison and Dr. Hester also to do that. Dr. Hester. Do you, in your view does the National Environmental Policy Act require your agency to discuss adverse impacts on biological diversity in Environmental Impact Statements?

Dr. HESTER. My answer would be similar to that of Chief Robertson in that it requires us to address major components of it, but not to the extent and degree that I think would be called for by this bill.

Mr. SCHEUER. Let me ask you, Mr. Robison and Dr. Hester. The agencies you represent together manage hundreds of millions of acres of lands including many areas of vital importance to biological diversity. In many cases, national parks and national forests exist side by side in the same regional ecosystem.

How does the Bureau of Land Management, the Forest Service and the National Park Service presently coordinate their efforts to manage land for the purpose of protecting endangered species, both animal and plant, and protecting biological diversity? Mr. Robert-

son, you might give us an answer. Perhaps all three of you could answer that question.

Mr. ROBERTSON. Well, we have coordination sessions between BLM and the Forest Service I'd say more frequent than with the Park Service, but we too have coordination sessions at this level but the bulk of the coordination goes on at the ground level. Just as an example, is the Yellowstone area.

The two park superintendents and I believe the five or six forest supervisors that we have out there, plus the BLM Director, all meet periodically and by periodically I mean many times a year to coordinate the activities for the coming year as well as coordinating major policy changes and I think if you were to look at the whole Yellowstone area, I believe that is a model for interagency coordination. But that sort of thing is occurring throughout the United States where we are adjoining land managers.

Mr. SCHEUER. Would you characterize that as a sort of an ad hoc, local condition, where for Yellowstone, you're cooperating and coordinating? Or would you characterize that as a national policy that's in place and would govern really all of the efforts of the three agencies in all of the lands that you control?

Mr. ROBERTSON. There is a, I know in the Forest Service and I think it would be true for the Park Service and the BLM, there is a general policy that we coordinate among the agencies at the local level. Now in the case of the Yellowstone, it is a very formal coordinating mechanism that has been set up—

Mr. SCHEUER. Formal coordinating mechanism. And that has served you well?

Mr. ROBERTSON. Yes.

Mr. SCHEUER. Wouldn't it be well to have such a formal coordinating mechanism in place for cooperation among the three of your agencies nationally and in fact, one wonders how it can be possible to maintain diversity on a regional scale without a cooperative planning mechanism among the three of you. If it works well—if a formal coordinating agency works well for Yellowstone, what's wrong with having such a formal coordinating requirement nationally? For the three of your agencies?

Mr. ROBERTSON. We have coordination, Mr. Chairman, I guess basically, it gets down to the degree of formality of it. For example—

Mr. SCHEUER. Well, you're telling us one place where it works very well. It is a formal process.

Mr. ROBERTSON. Yes.

Mr. SCHEUER. That's good. That's what we're seeking. There's an old saying, if it ain't broke, don't fix it. If a formal coordinating process works well in Yellowstone, why are you backtracking away so rapidly, so vigorously, from a requirement to establish that same kind of coordinating relationship between your three agencies nationally?

Mr. ROBERTSON. I'm not backing away from that. Coordination among the land management agencies is crucial. The question is the degree of formality that we need to make that happen. I think if it occurs naturally, that's the best possible way to get coordination among the agencies, and again, we have very good communications and coordination, in my opinion at the national level as well

as the local level. Park superintendents and forest supervisors frequently get together, I know BLM State directors and regional foresters and forest supervisors, there's just a lot of daily communication and working relationships going on out there. We have really put a lot of priority on that, especially between BLM and the Forest Service in the last 4 or 5 years.

I feel very good about that coordination.

Mr. SCHEUER. I still don't understand why you would oppose a policy requiring coordination?

Mr. ROBERTSON. I have no problem with the three—in fact, we already have cooperative agreement, memorandum of understanding, at the national level, with Park Service and BLM on coordination. I have no problem in saying here today and putting it in writing that we shall coordinate with BLM and the Park Service and Fish and Wildlife Service and all of the other natural resource agencies. One point, you were talking to Mr. Robison about inventory data.

We do have interagency, a five agency group inter-coordinating committee set up to deal with planning and inventory. That includes the BLM, the Forest Service, the Soil Conservation Service, which has a lot of responsibility for collecting resource data on the private land, the U.S. Geological Survey and the Fish and Wildlife Service. And so, there is that coordinating mechanism already established and that group of the committee members meets with the five agency heads at least once a year.

Mr. SCHEUER. All right. Dr. Hester, do you have anything you'd like to add?

Dr. HESTER. I'd just like to add to that, in the sense that we do have these agreements with both the Forest Service and BLM for coordinating our activities. I look at the one at the national level as being what we think of as an umbrella agreement. Under that, we develop more specific agreements as it relates to specific areas or specific issues.

For example, in coordination of research, I see that as a subcomponent of the overall agreement between the agencies—

Mr. SCHEUER. Dr. Hester, you know, listening to you and Mr. Robison, I frankly fail to understand how a bill could affect you adversely, if you say you're doing all of these things, why do you object to formally having it recognized in law that these kind of things should be done, that you're already doing?

Dr. HESTER. I think the way it works now, is we have this umbrella agreement and then we develop specific agreements on the basis of specific needs as opposed to a mandated requirement.

Mr. ROBERTSON. I think Mr. Chairman, and again you have a very good point about our testimony arriving late and I apologize for that, but I think you'll see in my testimony that I think this interagency working group to pool our knowledge and information as well as coordination among the agencies is a good idea.

Mr. SCHEUER. All right. I appreciate that. I would again invite the three of you to give us whatever constructive suggestions you have as to any change in language here that you feel would make this bill easier to live with. We're not trying to create some kind of straitjacket that is inimical to your ability to carry out your missions.

It seems to me from what you say that your intentions are quite consistent and a lot of what you're doing is consistent with the purposes outlined in the bill. So, we would very much welcome any contribution you would have to make to our thinking and to the language and to anyway that you think this bill could be improved so that you could work with it.

Mr. ROBERTSON. Well, I appreciate that Mr. Chairman.

Mr. ROBISON. If I might Mr. Chairman.

Mr. SCHEUER. Yes, Mr. Robison.

Mr. ROBISON. I do regret that our testimony was not here sooner, but I would pledge to you that we in the Bureau of Land Management would be happy to work with your staff in furtherance of the goal that you just indicated.

Mr. SCHEUER. All right. Would the other two of you sort of echo that willingness to work with us?

Dr. HESTER. Absolutely.

Mr. ROBERTSON. Yes.

Mr. SCHEUER. OK. Well, I thank you very much. You've been very patient and this panel has lasted longer than I thought it would. Before you go. Yes. Claudine Schneider, would you like to ask any questions? No? All right. Thank you very much, all three.

Mr. ROBERTSON. Thank you, Mr. Chairman.

Mr. SCHEUER. All right. Now we'll get to the next panel on environmental organizations. Dr. Rupert Cutler, representing Defenders of Wildlife; Dr. Faith Campbell, representing the Natural Resources Defense Council; Mr. Barry Flamm, representing the Wilderness Society; Mr. James Pissot, the National Audubon Society; and Dr. Mark Plotkin, representing the World Wildlife Fund.

STATEMENT OF DR. M. RUPERT CUTLER, DEFENDERS OF WILDLIFE; DR. FAITH CAMPBELL, NATURAL RESOURCES DEFENSE COUNCIL; BARRY FLAMM, THE WILDERNESS SOCIETY; JAMES PISSOT, NATIONAL AUDUBON SOCIETY; AND DR. MARK PLOTKIN, WORLD WILDLIFE FUND

Dr. CUTLER. Mr. Chairman, should I proceed? I'm Dr. Cutler.

Mr. SCHEUER. Why not? Why not proceed, Dr. Cutler. Take your 7 or 8 minutes, hopefully not reading your testimony, but chatting with us informally, referring to anything you've heard this morning, either from the panel here or the folks who appeared at the witness table.

Take your 7 or 8 minutes. Your full prepared testimony will be printed in the record, and then I'm sure we'll have some questions after your other copanelists have given their testimony.

Please proceed.

Dr. CUTLER. Thank you very much, Mr. Chairman. First, I'd like to say that it comes as no surprise to those of us at this table that you, Congresswoman Schneider, Mr. Hochbrueckner, Mr. Brown are sponsors of H.R. 4335, a bill to conserve the biological diversity that underpins our human life support system.

You're always there when we need you. Your constancy in this regard is deeply appreciated. For example, we recall vividly how you fought for passage of a strong endangered species act on the floor last December and won.

Now if only the Senate leadership would actually lead—

Mr. SCHEUER. Dr. Cutler, I'm not sure how much we won. We don't really think that the endangered species approach really does the job because by the time you've identified a plant or an animal as an endangered species, they are frequently so far down the slippery slope that it becomes hopeless.

What we have to do instead of engaging in the crisis sickness care, is to engage in some preventive health care for our environment and for our biodiversity, and this is what this bill is all about.

Dr. CUTLER. Well, you could actually rename it, an endangered species prevention act.

Mr. SCHEUER. Right. You're absolutely right.

Dr. CUTLER. That might make more sense to the public than biological diversity.

Mr. SCHEUER. I think you're absolutely right.

Dr. CUTLER. Well, Defenders of Wildlife says, please do report H.R. 4335 favorably. But we believe it should be amended to maximize its chances of making a difference and achieving its goal.

We have seven single-spaced pages of detailed suggestions, which I submit for the record, which I hope will be reproduced in the record and used by the staff in the markup process.

Mr. SCHEUER. You can be sure it will.

Dr. CUTLER. So at this time, I'll just hit the highlights. You may want to ask me a few questions at the end if these points need clarification.

Appended to my prepared testimony is a copy of my March 15, 1988 testimony, to the House Fisheries and Wildlife Subcommittee on amendments to the Fish and Wildlife Conservation Act of 1980, called the Non-Game Act, which I believe you'll find useful as you markup H.R. 4335.

There is some overlap in purpose and process, and the two laws should complement one another rather than conflict. I'd like to begin by passing along to the committee a definition of biological diversity drafted by our staff senior ecologist, Dr. Al Manville, to help us understand the issue before us.

"From ecologists-viewpoint, biological diversity is a management concept whereby complex ecosystems are maintained through protection of as many of the plant and animal biotic and abiotic entities as possible. The overriding theme is that a diverse ecosystem is a healthy ecosystem.

"As species diversity decreases, ecosystems decay and ultimately break down. Biological diversity ultimately ties into all ecosystems worldwide and thus is ecosphere-oriented."

In other words, the whole Earth. The approach is systems-oriented and is impacted by nearly everything we do. The greenhouse effect, ozone depletion, acid precipitation, plastic pollution, air and water quality, toxic chemicals, population growth, one of your favorite issues, Mr. Chairman.

All of these impact our environment and they all impact biological diversity. As you will note from a quick reading of my full testimony, most of our suggestions are technical in nature, designed to give the law teeth to assure that its biodiversity standards are practical and operational, and that third-party enforcement explicitly is provided for.

In other words, we want to help you craft a law that cannot be ignored by the executive branch. But in these oral comments, I'd like to emphasize the positive. The hope is that this new law would result in affirmative direction to the executive branch to compile a national biodiversity data base, the sort of thing you were driving at a few minutes ago when you asked the BLM if, in fact, their biodiversity analysis was tied in with that of the Forest Service, the Park Service, the States, the Nature Conservancy, and his answer essentially was no.

It should be. This national biodiversity data base should serve as a point of departure for efforts to save what is left of undeveloped nature in this country, and restore what we can of what we have lost, as well as a tool for requiring compliance with congressional direction.

The Defenders of Wildlife would like to spotlight the need to provide for the needs of large animal species which require vast home ranges to find food and avoid inbreeding.

Our suggestion is that future Federal land management plans and land acquisition priorities reflect the need to protect corridors of undeveloped habitat between parks, wilderness areas, and other preserves.

An expansion or supplementary definition of the term "greenway," which was used by the recent President's Commission on Americans Outdoors, such as wildlife habitat corridors between such places as Glacier and Yellowstone National Parks, for example, can greatly increase the carrying capacity of these areas for such species as the wolf and the grizzly bear.

There is a great upwelling of public interest nationwide, Mr. Chairman, for the restoration of the gray wolf to Yellowstone National Park.

I was just there last weekend. Covered by all the media, national press, Chicago Tribune, L.A. Times. We've had public service announcements printed in People Magazine, National Geographic, Time Magazine, corner page ads that say, restore the wolves' howl to Yellowstone Park.

Thousands of Americans have written for information, want to know how to help. That's the sort of thing you're after with your bill.

Without the large predators, our ecosystems are incomplete and, therefore, unstable. I would not be put off—

Mr. SCHEUER. Could you elaborate on that sentence?

Dr. CUTLER. Sure. As a matter of fact, one of the day-long subjects of the program at the Greater Yellowstone Coalition meeting in Yellowstone Park last weekend, dealt with this very issue.

When the large predators in the United States, the wolf, the mountain lion, the grizzly bear, are lost from an ecosystem, in Africa it might be the lions or the cheetahs or the hyenas, the other predators are lost, then the prey species become too abundant for their own good, basically.

They become subject to disease and parasites. They eat out all the vegetation available for their food supply. We've seen this eruption of ungulates; the deer, the elk, the antelope, the bison in Yellowstone Park and the creation in effect of something that looks more like Hyde Park in London with the over-eaten vegetation and

the browse line and all of the rest, in the absence of adequate predation.

That's an unhealthy system. When coyotes are killed and removed from a population, or foxes or bobcats, the prey species, the rodents, the mice, the rats, the rabbits and so forth, become over abundant and destroy the range.

Therefore, the purpose often of ranchers killing the predators comes back to haunt them. They might have eliminated some predation on their flocks, but they find that the resulting explosion in grass-eating rodents has competed with their animals for grass.

So it just comes back to haunt them. And when we interfere with that, it's an overused term but it actually exists in a dynamic way, the balance of nature, the predator-prey relationship, we're in for trouble. That's what I had in mind.

Mr. SCHEUER. Fascinating.

Dr. CUTLER. In conclusion, I'd like to leave plenty of time for my colleagues here, I would not be put off, and I see you're not put off, by the negative testimony from the agencies.

Their testimony is a product of the administration not noted for its concern for the protection of our environmental life support system.

It probably does not reflect the actual feelings of the Federal scientists employed by these agencies. Well, I'll stop at that point, Mr. Chairman, and respond to any questions now or later.

[The prepared statement of Dr. Cutler follows:]

Defenders OF WILDLIFE

TESTIMONY OF
M. RUPERT CUTLER, Ph. D.
PRESIDENT, DEFENDERS OF WILDLIFE
BEFORE THE
SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND THE ENVIRONMENT
OF THE
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
ON H.R. 4335
THE NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND RESEARCH ACT
JUNE 19, 1988

Mr. Chairman, I am M. Rupert Cutler, President of Defenders of Wildlife, an 80,000-member nonprofit environmental association headquartered in Washington, D.C. Our purpose is to provide for the protection of all native wildlife species and their habitats.

As Assistant Secretary of Agriculture during the Carter Administration, I was the official responsible for the drafting, adoption, and implementation of regulations intended to preserve biological diversity within the National Forest System as required by the National Forest Management Act of 1976. Today, as President of Defenders, I lead an organization long devoted to the preservation of biological diversity. Therefore, I am very appreciative of this opportunity to testify before you today in strong support of H.R. 4335, legislation designed to direct federal agencies to make the conservation of biological diversity one of their ongoing responsibilities, if the bill is amended along lines I will suggest.

In statutes already on the books, the Congress has urged agencies to consider biological diversity and even "required" its consideration in planning and programs. Too often, however, we have seen a lack of accountability in terms of deadlines, standards, and effective third-party enforcement mechanisms. Their absence has turned these "policy" statements by the Congress into relatively impotent pleas that are ignored by the agencies with impunity.

For example, Section 5(a) of the Endangered Species Act (ESA) requires the Secretary of the Interior and the Secretary of Agriculture to develop and implement a conservation plan for wildlife, fish, and plants, including but not limited to endangered and threatened species. If that has been done, we're not aware of its existence. Section 4 of the ESA requires recovery plans to be developed and implemented, yet many "listed" species have none, and those recovery plans that do exist are not being fully implemented.

Section 7(a)(1) of the same Act requires all federal agencies to implement programs for the conservation of endangered and threatened species, yet few agencies other than the land management agencies have active wildlife conservation programs. Similar assessments can be made of other related statutory tools, such as the "Areas of Critical Environmental Concern" language in the Federal Land Use Policy and Management Act. The main reason for this inaction is that Congress provided neither deadlines nor opportunities for third-party enforcement nor other means of holding the agencies' feet to the fire. Therefore, when presidential appointees without enthusiasm for this charge are in command, efforts to preserve diversity dwindle or cease altogether.

This Subcommittee, its Chairman, and the sponsors of this bill are to be congratulated for responding to the need -- proclaimed by many of us and well documented by the Office of Technology Assessment (OTA) -- for a comprehensive approach to the protection of native wild species, their genetic integrity and diversity, and the intact ecosystems on which they depend. These are the basic building blocks of life. That is what is at risk if we do not act.

The action we take must be effective as well as conceptually sound. We need to develop a workable and enforceable system, with standards that can be improved as our knowledge improves, but that serves to conserve these resources today. If we are unsure of how to create enforceable standards to protect biological diversity beyond those existing in law, we should at least create a process that will enhance and expedite the implementation of existing conservation programs and provide for the enforcement of existing standards.

Defenders of Wildlife urges passage of H.R. 4335 if it is streamlined and if its provisions are recast to provide for more accountability and ease of enforcement, with the encouragement of outside parties if necessary. Our suggestions are as follows:

Section 2. FINDINGS: This section should be shortened. Much of it can be moved to the Committee Report. The report should direct that implementation should include assessments of the health of interrelationships of "biotic" and "abiotic" systems and associated nutrient chains.

Section 3. DEFINITIONS: The definitions are broad. Research should be broad in scope, but overly broad standards are unenforceable. For example, consider a federal action that would eliminate a measurable or statistically significant portion of the gene pool of a given subspecies or eliminate a small wetland which is by definition different from any other. Would that be considered inconsistent with the goal of conservation of biological diversity?

Should we attempt to protect all living things? Probably not disease microorganisms, but where do we draw the line? Our definition of pests has changed rapidly as we have begun to understand the workings of nature. The Federal Animal Damage Control Act still calls for the eradication of predators such as wolves. It has been superceded by the listing of wolves as endangered and threatened species, but that has not restored the predator-prey balance to many of our ecosystems.

How inconsistent with the general policy would actions have to be before they could be stopped? We have numerous advisory guidelines that are sometimes helpful but often simply ignored. Without precision in the law itself, or in regulations required by a certain time and by a certain official, another set of advisory guidelines will create considerable frustration and disappointment.

One solution might be to require the assessment of the impact of proposed federal actions on all species and ecological communities and prohibit degradation that may significantly decrease the viability of species or ecosystems unless the Interagency Committee grants an exemption in the manner of the so-called "God Committee" established in Section 7(g) of the ESA. Such an exemption process could be copied from the ESA and used in this bill. This statutory direction should be given in Section 5.

Section 4. PURPOSES: One of the purposes is to establish a strategy; another is to establish coordination. I suggest you add "and standards" after "strategy" if you want standards to be developed that control actions.

Section 5. POLICY: This section is key -- 5(c) in particular. First, I suggest that you strike the two words "efforts toward," for it is conservation and not efforts toward it that is the goal.

We applaud your global approach in Section 5(b). The OTA report ignored the applicability of the Endangered Species Act to U.S. actions affecting species overseas and treated it only as a domestic law, for example. By its own terms it is not, and neither should this law be, for there are practical ways we can address the problem. Biology knows no national borders, just as pollution knows no political perimeters. We must recognize that, unless we look beyond our ecosystems and control our effects on the ecosphere, we will not only accelerate extinctions here, but we will negligently continue to export forces leading to extinctions elsewhere.

Section 5(c) may be the most important sentence in the bill. It is similar to Section 7(a)(2) of the Endangered Species Act, which provides essentially that no federal agency action shall jeopardize the continued existence of a species that the Secretary of the Interior has found to be endangered or threatened, or result in the destruction or adverse modification of habitat that the Secretary has declared to be critical to such a species' survival.

If the term "biological diversity" is defined, in the bill or in regulations, in an objective, measurable, and practical way, and if citizens can sue to enforce this law and in particular this subsection, then this policy will be heeded. This might be done using the "significantly decrease viability" test I outlined above, meaning statistically significant, and not the larger "substantial" or other more amorphous term. (See discussion above in Section 3: Definitions.) If the Congress chooses not to enact an enforceable standard, then it would be more forthright to require simply that the agency record show that biological diversity was considered in the development and implementation of agency actions.

As you know, Mr. Chairman, we are at a critical point in the evolution of public policy on this matter, and that is why we are here today. Defenders has pressed the effort to halt extinction through enforcement of the Endangered Species Act. That act

provides protection only after species are listed. The listed species have clearly been helped, but less than two dozen are demonstrably on the road to recovery. In 1985, nearly 300 species that had been awaiting listing were declared by the Secretary to be extinct or possibly extinct. This is almost a third as many as had been listed. Though roughly a thousand are listed, nearly as many warrant listing but have not been, and twice as many are official candidates for further analysis. Some experts say that we may be losing more than a species a day as a result of human-kind's direct or indirect degradation of the natural environment.

Section 5(c) is intended to require federal agencies to anticipate the effects of their actions on all species and habitats and design those actions so that species or genetic diversity within species will not be degraded. Unlike the protection from "taking" afforded listed species by the ESA, however, it would not rule out the killing of any species. Therefore, it would not protect biological diversity from the actions of non-federal entities.

Section 5(d) may not be necessary, since it is clearly within the scope of the National Environmental Policy Act (NEPA). However, such a statutory requirement, even if redundant, would help ensure that the assessment is carried out.

Section 5(e)(1) should be incorporated in (d) and the analysis required in paragraph (2) -- probably beyond the capacity of the Council -- should be assigned to another body such as the Department of the Interior.

Either in Section 5 or in a separate section the Congress should provide that any person may bring an action in federal court to enforce any requirement of the Act. Attorneys' and expert witnesses' fees and costs should be awarded any substantially prevailing plaintiff.

Sections 6, 7, and 8, concerning the Center, the Interagency Working Committee, and the strategy, should be consolidated. To assure the institutional ability and accountability necessary, responsibility for the work envisioned in these sections should be assigned to one federal official. That official should be responsible for those functions proposed for a Center that are not already now underway. (We are not convinced of the need for a new Center as such.) That official should chair the Interagency Committee as well. We suggest that this official be the Secretary of the Interior.

The Interior Department's Fish and Wildlife Service has responsibility for protecting biological diversity under the ESA, the Fish and Wildlife Coordination Act, the Fish and Wildlife Conservation Act, the Sikes Act, and numerous other statutes and conventions. This gives the Secretary unique experience with assisting in the preservation of diversity here and abroad by controlling the impact of agency actions on the biotic community beyond federal lands, both here and, under the ESA, abroad.

Federal efforts in this vein to date have been insufficient. Yet we should not duplicate the existing efforts of public and private entities such as the Interior Department, the Smithsonian, The Nature Conservancy, and the State Natural Heritage Programs. The proposed Interagency Committee is an excellent idea. It should include the State Department, but should be chaired by the Secretary of the Interior.

The strategy envisioned in Section 8 would be helpful. It should address the effect of federal grants, as suggested, but also include loans, insurance guarantees, technical assistance, and taxes among the federal actions that may affect biodiversity. Paragraph (14) should be added to subsection (a) so that it is clear from the outset that the strategy is to be global and that concern for the effects of actions on species overseas is not just an afterthought.

The strategy must incorporate assessments of habitat fragmentation and use the concepts of island biogeography to help counteract habitat loss. These should include the preservation through acquisition, easements, and land use regulation of both large habitat areas and undeveloped corridors between major habitat areas.

The strategy should emphasize techniques that do not depend on perpetual manipulation. It must bring the concepts of sustainability and ecosystem integrity to the forefront in land management and planning. This is simply the old rule of stewardship and sustained yield, supported by the increasingly detailed understanding of ecological relationships.

Section 9. GRANTS: The grant program is a good idea, but too little money is authorized to make an impact. Unique research that is not single-species-specific should be encouraged.

On March 15, 1988, I submitted testimony before the Merchant Marine Committee's Subcommittee on Fisheries, Wildlife Conservation and the Environment on amendments to the Fish and Wildlife Conservation Act (FWCA) of 1980. I believe H.R. 4335 has also been referred to that Subcommittee. The purpose of the FWCA is to provide grants for the conservation of "nongame" wildlife to those states whose plans and capabilities meet standards to be developed by the Fish and Wildlife Service. My testimony recommends a funding level of \$50-100 million, preferably from the portion of the highway trust fund attributable to taxes on gasoline not used on highways. I also recommended broadening the program to encourage comprehensive wildlife management for all species and all major human activities affecting them. The grants envisioned in the biodiversity bill could be combined or run in conjunction with the FWCA grants. A copy of my testimony on the FWCA is attached to my written testimony that I am delivering today.

It is also worth noting that Interior's Fish and Wildlife Service administers grants to Cooperative Research Units at universities in 35 states. This program now includes research in

the area of biological diversity. (For example, see Species Richness, J. Michael Scott et al. in Vol. 37 of BioScience pp. 782-788. Dr. Scott is the unit leader of the Idaho Cooperative Fish and Wildlife Research Unit.)

The Secretary of the Interior should also be given the authority over the grants program with nominations provided by the Interagency Committee and the Advisory Committee.

Section 10. ADVISORY COMMITTEE: This section need only be amended to reflect changes in other sections.

Section 11. AUTHORIZATIONS: The authorization should be provided to the Department of the Interior for fiscal years 1990 through 1992 because fiscal year 1989 appropriation decisions are being made now.

The relatively small size of the suggested appropriation authorization proves the point that we cannot hope to conserve our ecosphere through spending programs alone. Given the trillions of dollars being spent around the world on actions that generally reduce diversity, we need legal and scientific tools to channel that greater spending in more responsible life-sustaining ways. We recognized this early in this century when land use planning and regulation were implemented by state and local governments. That and responsible behavior by federal agencies are the only ways that we can end the loss of biological diversity in the long run.

In summary, ecosystem conservation cannot be the part-time job of just a few agencies. It must be inherent in all government policy, planning, and action. The preservation of genetic resources is the most fundamental element of conservation strategy. To be less conservative is to run the radical risk of eliminating not just the odd species here and there, but of eliminating the ability of earth to sustain life at all.

Thank you again, Mr. Chairman. That concludes my testimony. I will be happy to respond to questions.

Defenders OF WILDLIFE

TESTIMONY OF
M. RUPERT CUTLER, Ph.D., PRESIDENT
DEFENDERS OF WILDLIFE
BEFORE THE
SUBCOMMITTEE ON
FISHERIES AND WILDLIFE CONSERVATION AND THE ENVIRONMENT
OF THE
COMMITTEE ON MERCHANT MARINE AND FISHERIES
OF THE
HOUSE OF REPRESENTATIVES
CONCERNING AMENDMENTS TO
THE FISH AND WILDLIFE CONSERVATION ACT OF 1980
MARCH 15, 1988

1244 NINETEENTH STREET NW • WASHINGTON, DC 20036 • (202) 650-9510

Mr. Chairman, I appreciate the opportunity to submit for the printed record these comments by Defenders of Wildlife on amendments to the Fish and Wildlife Conservation Act (FWCA) before the Subcommittee today. The opportunity to supplement this testimony with additional information for the record on the FWCA, the Sikes Act, and the Lacey Act in the near future also is appreciated, and we expect to do that. This statement is limited primarily to our comments on the FWCA.

Since early in the last Congress, Defenders staff have extensively surveyed state non-game programs and chaired a broad coalition of national groups dedicated to implementing and improving the FWCA. Although the positions of the member organizations are not always identical, there is a strong consensus that work on behalf of "non-game" wildlife and the preservation of natural biological diversity through this legislation must begin soon, at a substantial level. If that work does not begin soon we will be unable to avoid a severe depletion of the abundance and diversity of scores of species that are neither endangered nor harvested but suffering from a neglect that is anything but benign. The literature is replete with examples of birds, from loons to bluebirds, whose decline has been slowed largely by volunteer efforts and small state programs. They have done what is possible given existing resources, but their success in aiding these two popular species is evidence that a coordinated and well-funded national effort can help even more species. We will address specific examples in supplementary information we will provide for the record. (Attached is Testimony by Albert M. Manville II, Ph.D., Defenders Senior Biologist, on this subject before the President's Commission on Americans Outdoors. Figures 1-3 provide examples of the decline among migratory birds -- just one category of concern.)

OVERVIEW

Concerning the FWCA, or Nongame Act, its greatest deficiency is that it has never been implemented. If fully funded and implemented as written, it would advance fish and wildlife protection by light years. However, there are some changes in the language of the Act would improve it.

As noted in the specific amendments we propose below, biological diversity and ecosystem protection strategies should be encouraged rather than a focus on single species only. States should be encouraged to adopt more efficient structures for the administration and funding of their nongame programs.

We recommend providing \$50 million for Fiscal Year 1990 and up to \$100 million per year annually by Fiscal Year 1992.

We recommend including invertebrates, plants, threatened and endangered species and marine mammals in the definition of "non-game fish and wildlife" but retaining the emphasis on the conservation of "non-game wildlife", in the context of preserving biological diversity and ecosystem integrity.

A FUNDING MECHANISM

An annual amount of \$50 to \$100 million should be provided. This can be accomplished in a number of ways as outlined in the 1983 report by the Fish and Wildlife Service. Several of these funding methods are user fees or extraction fees related to federal lands resource development. (These are outlined in part in the attached statement of Dr. Manville.) These might be appropriate sources of support for Sikes Act implementation as well. However, one of the most equitable and efficient funding means may be to redirect the Federal taxes on motor fuels not used on highways from the the \$12 billion Highway Trust Fund to biological diversity protection work primarily through the FWCA program. A recent study by the General Accounting Office, Resource Protection: Using Gasoline Taxes to Fund the Nongame Act indicates that the portion attributable to lawnmowers and other outdoor power equipment (not including off road vehicles) is between \$21 and \$48 million -- nearly in the \$50-100 million range that we recommend.

The Highway Trust Fund was intended to build and maintain the interstate highway system. It is fair that the tax on those fuels not used on highways be devoted to maintaining the natural environment that those uses mowers, or offroad vehicles be they chainsaws, mowers, or offroad vehicles affect. Even under regulation, such uses have effects on wildlife and ecosystems that should be mitigated. Further, earmarking part of the existing tax would neither raise taxes nor require new collection systems, nor impose a burden on those whose actions do not consume or reduce the resource. For jurisdictional reasons it may be best to allow the Senate Environment and Public Works Committee to adopt this approach initially since its jurisdiction includes both the FWCA and the Highway Trust Fund. Pending the development of such sources, we recommend that this Subcommittee authorize direct appropriations of \$50 million for FY90, \$75 million for FY91, and \$100 million for FY92 in Section 11 of the Act. Absent such effective funding systems or authorization levels, a shorter reauthorization period should be provided.

SUBSTANTIVE AMENDMENTS

Section 2 (a) (5)

Delete the phrase "the conservation of fish and wildlife, particularly those species which are indigenous to the State," and replace it with "a plan for the protection of all indigenous species of fish and wildlife."

The existing language appears to permit activities designed to protect exotic species with nongame funds, which is inappropriate.

Section 2 (b) (1)

Under purpose, after the word wildlife, add: "to preserve biological diversity and prevent the depletion of native species."

There is no reference to the protection of diversity in this act. The purpose section is an appropriate place for it.

Section 3 (4)

Delete the word "primary" and add "including agencies or organizations such as Natural Heritage programs" at the end of the first sentence, ending with the word wildlife.

The purpose here is to enable Natural Heritage programs to receive funding under the act, if their proposed projects are incorporated into the state's approved conservation plan. In many cases, the existing or former Conservancy staff members who run the Natural Heritage programs have a clear idea of what needs to be done to identify species and habitats in need of protection. To the extent that they have effective working relationships with the state's nongame staff, they can encourage effective improvements in approach and priorities.

Section 3 (5)

Replace the word "vertebrate" with the word "native" and add plants.

Protecting habitat means protecting all life forms in an ecosystem. Limiting the funding to vertebrate species fosters the single-species approach which isn't working.

Section 3 (6)

Replace the word "vertebrate" with "native," and add plants.

Section 3 (6) (B) and (C):

Delete both paragraphs (B) and (C).

Expand the sentence excluding domestic and feral animals to include introduced exotics.

There is generally no reason to include exotic species in a nongame plan except to provide for their removal.

Section 4 (2)

Expand first line to include an inventory of "essential habitats."

This is a major, substantive revision which is absolutely essential in this process. The agencies have been inventorying species one at a time, in most cases without identifying their habitat requirements. This plan should require every state to develop a map or list of the essential habitats to be protected for the purpose of preventing the depletion of indigenous species. We know of no state which has adequately accomplished this task, and only a handful understand its importance.

Section 4 (10)

Add private conservation organizations to the list of entities to be consulted in the preparation of the plan.

There are many states in which the private groups, particularly the Nature Conservancy, have done as much as the state agencies in conserving native wildlife and its habitat. Private Wildlife conservation organizations should be involved in the planning process, not just invited to review the plan when it's finished.

Section 4 (11)

Add a paragraph requiring that in order to qualify states must directly incorporate in the plan specific funding for nongame conservation and incorporate the nongame plan in turn fully into the agency's budget process. Specify that the plan must include a reliable source of funding which is not dependent on private contributions for a majority of its funding.

This is the major sticking point in the implementation of plans. Doing a plan is a useless waste of federal and state money if the agency doing the planning has no intention of funding the plan's implementation. Examples of this are easy to find. For example, Oregon has a 300-page plan which has never

been reviewed in the context of the budget process.

Section 6 (a)

Reword first line to read: "Any agency with the authority for the conservation of nongame fish and wildlife may apply..." Change the word "state" to "agency" in line 2.

This revision may be necessary to allow quasi-governmental entities like Nature Conservancy/Heritage programs to obtain funding.

Section 6(e) (2) & (3)

Change the dates by adding approximately six years to each date.

Most of these deadlines have passed already yet no funds were available.

Section 6(e) (3) (D)

Drop, or rewrite to offer incentive for states to develop a comprehensive plan which protects biological diversity without regard to game/nongame status. The overall objective of the plan should be to prevent the depletion of native species of plants, vertebrates, and invertebrates.

We also recommend that a higher percentage of federal funding be made available to states in which the authority for the conservation of wild native vertebrates, invertebrates, plants, acquisition of essential habitats, and nonconsumptive wildlife recreation is consolidated in one agency, and additional incentives should be included for those states that show actual coordination with agencies that control pollution, land use, and other factors affecting wildlife.

In our view this subparagraph encourages business as usual with agencies, for example, claiming to "manage all wildlife" when in fact they do not. Colorado, New York, Pennsylvania, and others have alienated much of the conservation community by asserting that their game management is really wildlife management. What this means is that nongame may incidentally benefit from some management activities, and is just as absurd as the claim that clearcutting always benefits wildlife, or that good timber management is good wildlife management, per se.

The protection of wetlands does benefit many species, but the propagation of exotic game birds and fish does not, and in fact, may conflict with the welfare of native species. The standard for evaluating plans must be tougher and more explicit.

INTEGRATION WITH THE FEDERAL NONGAME EFFORT

The respective roles of the states and federal governments with respect to "nongame" conservation are somewhat unclear. It would be helpful to amend this act to clarify these roles, perhaps by providing a section on "Integration of State and Federal Programs".

In addition to setting the standards for plans funded through the FWCA, the Federal Government should:

1. Coordinate state nongame efforts to ensure that they do not duplicate the efforts of the federal government or each other. The primary emphasis here should be on migratory birds, endangered wildlife and marine mammals, because they are under federal jurisdiction. The federal duties in this regard might be more specifically referenced in the FWCA.
2. In order to implement the FWCA and Section 5(a) of the Endangered Species Act, by 1989 complete a map of all habitat in the United States, noting types of plant and animal communities and indicator species. Within that effort, by 1989, identify unique wildlife ecosystems for early acquisition as part of the National Wildlife Refuge System and propose several each year for acquisition in an effort that goes beyond the current emphasis on endangered species and waterfowl.

There are numerous tools already available for such analysis ranging from NASA infrared, atmospheric gas and other mapping systems to Department of Agriculture Handbooks such as No. 533 covering Life Form Association with Plant Communities, (September 1979).

The FWS does have responsibility to preserve biological diversity under other statutes. This obligation is being largely undercut and ignored. This problem must be acknowledged and addressed. This hearing is another positive step in that process. Defenders will continue to cooperate with you in the effort to address these issues. Thank you.

TESTIMONY OF ALBERT M. MANVILLE II, Ph.D.,
WILDLIFE BIOLOGIST, WILDLIFE MANAGEMENT PROGRAM,
DEFENDERS OF WILDLIFE

ON

NONGAME WILDLIFE ISSUES
presented before the
PRESIDENT'S COMMISSION ON AMERICANS OUTDOORS

MGM GRAND HOTEL
RENO, NEVADA
23 March 1986

ABSTRACT:

Nongame wildlife activities have been shown to be of great interest to Americans; 83 million engaged in watching, photographing or feeding birds or other wildlife in 1980, while 93 million participated in some form of nonconsumptive wildlife use. In 1980, nonconsumptive users collectively spent some \$6.6 billion on transportation, lodging, food and equipment ... \$500 million alone on birdseed. Birdwatching is currently ranked as one of this country's most popular outdoor recreational activities. Presently, there are 816 species of migratory birds in the U.S., 654 of which are listed as "nongame"; 103 were previously hunted but currently are not because of low populations. Therefore, 93% (757 bird species) are effectively nongame. Twenty-eight nongame species have been identified as in trouble, but not yet ready for listing under the Endangered Species Act. Declining populations, loss of habitat, increasing interest in birds and other wildlife, and a mandate by the Nongame Act make nongame wildlife funding imperative. Several long-term funding options, which would help states and territories develop and implement effective nongame programs, merit serious consideration as they will in no way increase the deficit and are equitable. We specifically recommend the following options: a \$25 renewal fee on mining claims on public lands (raising \$30 million/yr.); severance tax on mineral production on public land (\$120 million/yr.); a seabed mining tax (no estimate); Forest Service ski area revenue fee (\$3 million/yr.); utility right-of-way fee (\$2 million/yr.); public land impact fees (\$100 million/yr.); excise taxes on certain photographic equipment, film, and spotting scopes (\$34 million/yr. at 5%); and semipostal stamp revenue (\$40-50 million/yr.). Federal and state nongame wildlife programs need at least \$100 million annually.

MADAME CHAIR AND MEMBERS OF THE COMMISSION. I am Dr. Albert M. Manville, wildlife biologist, Wildlife Management Program with Defenders of Wildlife. Thank you for allowing me to testify here today. I am here on behalf of our 100,000-plus members and supporters who have a keen interest in the future of America's wildlife resources.

Defenders of Wildlife (Defenders) is a Washington, DC-based national wildlife conservation organization. We are committed to the goal of preserving, enhancing and protecting the natural abundance and diversity of wildlife, and maintaining the integrity of natural wildlife ecosystems, including those within units of the National Park, National Forest and National Wildlife Refuge Systems.

NONGAME WILDLIFE DISCUSSION

Defenders has a keen interest in both federal and state nongame wildlife issues, and would like to briefly address this subject as it specifically relates to 2 questions directed at the Commission:

- 1) What will Americans want to do outdoors over the next generation? and
- 2) How can the public and private sectors ensure that there will be appropriate places to do it?

Americans have greatly increased their interest and participation in a multitude of outdoor recreational pursuits. One such activity, showing a phenomenal recent rise in popularity, is bird watching ... currently ranked as one of this country's most popular outdoor recreational activities.

In 1980, a survey by the US Fish and Wildlife Service (FWS) revealed that some 83 million Americans engaged in watching, photographing or feeding birds or other wildlife. In fact, of Americans 16 years or older in 1980, 93 million ... or about one third of the American public ... participated in some form of nonconsumptive wildlife use. For the businesses related to these activities, sales were lucrative. Nonconsumptive users collectively spent some \$6.6 billion in 1980 on transportation, lodging, food and equipment; some \$500 million alone was spent on birdseed that year ... about \$517 million in 1984.

Also in 1980, 42 million anglers spent \$10.2 billion, while 17 million hunters spent some \$8.5 billion. But while revenues from anglers and hunters have increased since 1980, their numbers have declined. Licensed fishermen dropped slightly from some 29.13 million in 1983 to 29.02 in 1984; licensed hunters fell from 16.37 million in 1983 to 16.02 million in 1984. To update these statistics, the FWS's "National Survey of Fishing, Hunting, and Wildlife-Associated Recreation" is presently being conducted.

One complaint by the hunting and fishing fraternities has been the nonconsumptive community's failure to pay "its fair share" for nongame fish and wildlife research and habitat acquisition programs. Until 1980, Pittman-Robertson (PR) and Dingell-Johnson (DJ) were the only funding mechanisms providing direct public hunting and fishing revenues for fish and wildlife conservation activities. With the passage in 1980 of the Fish and Wildlife Conservation Act (the Nongame Act) it was thought that this would change. Where before PR and DJ funded research and habitat acquisition for game and fish, the Nongame Act was heralded as a major funding step for nongame.

The Act called for a detailed analysis of nongame funding options, as well as a system for states to develop and implement nongame programs, their efforts to be reimbursed by the federal government. Unfortunately, no money was ever specifically appropriated for the state nongame programs, and at present, still has not been. The nongame program is the one program for recreational America for which there exists a demonstrable need but essentially no program. We have a mandate in law to develop a federal program for the management and enhancement of nongame species. That law is enacted in light of the stark fact that the states have neither the resources nor the capability to adequately address the decline of hunted or nonhunted species (see beyond).

Since bird watching, bird feeding, avian photography, upland gamebird and waterfowl hunting are such popular pursuits, let's analyze the migratory bird population status in light of these activities. At present, there are 816 species of migratory birds in the United States, 654 which are listed as "nongame" (Figure 1). Add to this list game species which previously were hunted but currently are not because of low populations (103 [note, also, the precipitous declines of all but one of the top 10 waterfowl species]), totalling 757 birds, thus 93% of all federally managed migratory birds are effectively nongame. Yet the budget for these nongame species is only a fraction of the funds spent on management of game birds by the FWS.

Of the nongame birds, the FWS has identified 28 in trouble. Members of the Commission, I have listed examples of these from some of your states (Table 1). These are birds which are not as yet candidates for listing under the Endangered Species Act, but soon could be. These species have been declining for a number of reasons, including human disturbance, loss of habitat, heavy metal contamination, effects of pesticides and other toxics, acid precipitation problems, hunting and other impacts.

It is our intent to see that declining species are further identified before they reach critical stages, requiring recovery programs of demonstrated high cost, both in manpower and funding, while waiting too long for positive actions to be taken, and to provide ecological information necessary to respond effectively. Defenders has been working hard to see that this goal is

accomplished.

Defenders specifically is working to fund a cooperative program conducted both by the states and federal government. It is a bird censusing project, cheap to conduct and very cost-effective. The program will rely on considerable volunteer help, and data would be collected and analyzed by FWS biologists and biometricians. Data analysis should reveal which bird populations are declining and mitigating measures then could be recommended. The program will, we hope, eventually be oriented not just to migratory birds, but to mammals, reptiles, amphibians, fish and plants ... our overall flora and fauna. The program is certainly an energetic one, but full support is absolutely essential.

Funding for state nongame activities has commonly been acquired through state tax checkoff programs. The FWS and others continue to espouse the success of state tax checkoff programs as reliable sources of substantial amounts of money for state nongame conservation efforts. Let's look at the record.

Although 8 states noted increases in revenues from tax checkoffs between 1983-84 (net gain of \$646,415), 20 states logged revenue decreases between '83-84 (net loss of \$1,193,624; Table 2). Colorado is a good case in point regarding declining revenues (Figure 2). Even if the income from all state checkoffs were increasing, and they certainly aren't, the revenues would be far from adequate. Because of continued minimal funding for endangered species in most states, state biologists often are forced to concentrate on a very few species, sometimes at the expense of other nonendangered nongame species.

The Congress planned for federal aid for nongame wildlife in the Fish and Wildlife Conservation Act of 1980. It called for several steps and anticipated the creation of a major fund for nongame work. Congress directed the FWS to present funding alternatives. The Act, however, is expected to be reviewed and renewed by the end of 1986. The House has approved a bill, but the Senate has not yet acted. We have urged them to include this fund in the bill. We suggest that the President's Commission on Americans Outdoors endorse this idea and support enactment of said legislation.

Defenders would like to recommend some long-term nongame wildlife funding options which we hope you, as members of the Commission, will recommend to the President. These options were published in the December 1984 report by the FWS, "Potential Funding Sources to Implement the Fish and Wildlife Conservation Act of 1980" (PFS) ... the report which Congress mandated the Service to complete concerning alternative funding mechanisms for enhancement programs for nongame wildlife. The options, we feel, are innovative, equitable, reliable and would provide substantial sources of income for nongame research and management. These funding mechanisms would in NO WAY increase the deficit. If adopted, these options would bring in at least \$329 million

annually, a minimum of \$100 million of which would be used for nongame (less than \$2 million per state and territory).

I. \$25 Claim Renewal Fee

\$30 million raised

The PFS report notes that annual affidavits must be filed with the Bureau of Land Management (BLM) in order to preserve mining claims on hardrock minerals on public land. These affidavits must show that the claimant has performed \$100 worth of work in that year. In 1980, had a fee of \$25 per claim been charged, the 1,206,678 unpatented claims of record would have resulted in \$30.2 million. So as not to increase the impact on smaller operators the fee could be paid in lieu of that expense portion of the exploration/development work required by the BLM (i.e., only \$75 necessary in improvements rather than \$100 [refer to PFS report p. 131]).

II. Severance Tax

\$120 million raised

The PFS report indicates that if minerals produced from public domain lands had been taxed at the same level as production from other land then \$120 million would have been raised in 1980 alone. The report further notes that this undertaxation of minerals from federal land fails to internalize the external effects of mining (such as erosion, pollution and fish and wildlife habitat destruction). The tax would also actually improve economic efficiency of the marketplace.

III. Fee or Tax for Development of Some Federal Lands

\$5+ million

1) Although seabed mining is, at present, in the preparation and exploratory phase, nongame and other wildlife programs -- especially marine wildlife -- could be funded in part by royalty payments like the 16.7% imposed on Outer Continental Shelf oil and gas production. The Deep Seabed Hard Mineral Resources Act of 1980 imposed a tax on the removal of hard mineral resources and established a revenue-sharing trust fund. If the Law of the Sea Convention is not ratified, this fund will become available in 1990 for uses other than the contributions to an international fund envisioned in that Treaty. Not yet triggered, it remains likely to generate millions of dollars once extraction begins.

2) Half of the U.S. downhill ski areas are located on Forest Service land. The resorts now pay a gross revenue fee of 2.5-3.5% annually. Increasing the fee to 4.5% would generate \$3 million in additional annual revenues.

3) The Forest Service and the BLM have recently collected rents of only 4-6% of fair market value of the land used by utility rights-of-way, in itself a fairly low return to equity. Doubling this rate would provide an additional \$2 million annually.

IV. Fees for Other Consumptive Uses (Goods) or Services from Federal Lands **\$100 million**

The House and the Senate have each taken action in recent years to assess visitor fees on refuges through the Emergency Wetlands Resources Act of 1985 for the purpose of funding further acquisition of refuge lands.

We are reluctant to charge taxpayers for the privilege of simply visiting refuges that they already pay to maintain. However, by assessing or raising fees on activities that have a substantial impact on refuges and other public lands -- oil and gas extraction, off-road vehicles, overnight campers, for example -- substantial funds could be raised for nongame programs, including land acquisition. If a \$2 per day fee per visitor could raise over \$100 million (not counting BLM and TVA lands) as the FWS PFS report indicates, then a substantial amount could be raised by assessing all higher impact uses according to their estimated impacts on the refuges, sanctuaries, and other lands.

V. Excise Taxes and Semipostal Stamps **\$74-84 million**

We believe that excise taxes should also be investigated thoroughly but recognize that a number of procedural and political roadblocks may make them difficult. One lucrative source of funds would be excise taxes on photographic equipment, film, binoculars and spotting scopes which would generate substantial sources of money and have logical relationships to nonconsumptive wildlife activities such as photography and birdwatching. A 1% excise tax on this equipment would accrue some \$7 million; a 5% tax, \$34 million.

Semipostal stamps have been quite successful overseas and would provide a rewarding and voluntary opportunity for nonconsumptive users and others to contribute to nongame wildlife conservation. They would result in perhaps \$40-50 million annually for nongame work.

In conclusion, adequate nongame funding, as examined through revenue options determined by a Nongame Act mandate, will ensure proper development and implementation of nongame programs in each of our 50 states and 6 territories. These programs, in turn, will not only help identify and manage nongame species in trouble, but will ultimately provide the American public with further opportunities to save as well as enjoy our nongame resources and their habitats. Public, legislative and executive support for the aforementioned funding mechanisms is, therefore, critically important.

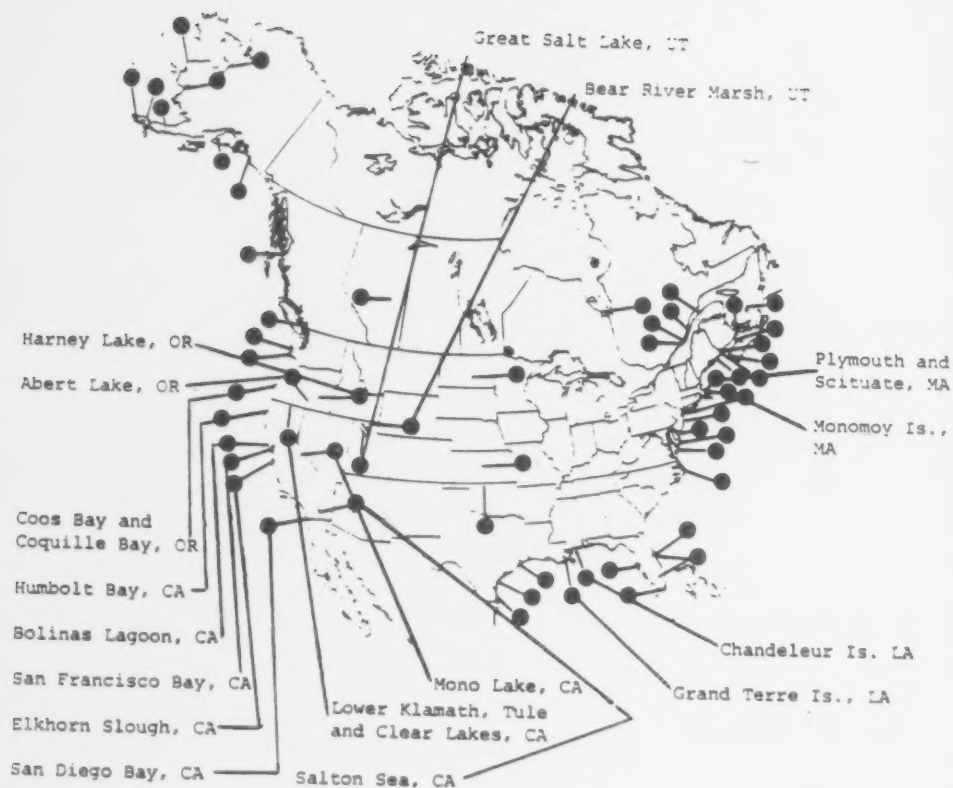


Fig. 1. Some important and traditional stopover sites for migrating shorebirds in North America. Each of these sites illustrated is believed to support 20,000 or more shorebirds of all species combined during peak migration periods (after S. E. Senner and M. A. Howe. 1984. Conservation of Neararctic shorebirds. In J. Burger and B. L. Olla (eds.). Shorebirds: Breeding Behavior and Populations, Plenum Publ. Corp., pp 379-421).



Fig. 2. Status of 816 species of North American migratory birds: 654 (80%) are nongame species, 103 (13%) are nonhunted game species, and 59 (7%) are hunted game species. Ninety-three (93) percent of the federally protected migratory birds are effectively nongame.

Table 1. Some examples of nongame migratory bird species of concern, showing significant population declines, and/or on state lists for endangered, threatened, or rare classification.

<u>ARKANSAS</u>	<u>CALIFORNIA</u>	<u>CONNECTICUT</u>	<u>ILLINOIS</u>	<u>LOUISIANA</u>	<u>MASSACHUSETTS</u>
least tern least bittern barn owl loggerhead shrike Bachman's sparrow	common loon least bittern white-faced ibis northern harrier black rail snowy plover gull-billed tern least tern spotted owl loggerhead shrike Bell's vireo	least tern common tern northern harrier black-crowned night heron American bittern roseate tern 24 species of songbirds	common loon American white pelican black-crowned night heron snowy egret double-crested cormorant great blue heron Swainson's hawk ferruginous hawk merlin long-billed curlew upland sandpiper caspien tern sage thrasher western bluebird trumpeter swan	common loon least tern osprey reddish egret wood stork	common loon upland sandpiper 24 species of songbirds
<u>MISSISSIPPI</u>	<u>MISSOURI</u>	<u>NEW HAMPSHIRE</u>	<u>NEW MEXICO</u>	<u>OREGON</u>	<u>SOUTH CAROLINA</u>
red-shouldered hawk least tern loggerhead shrike Bachman's sparrow	least tern red-shouldered hawk northern harrier black rail upland sandpiper barn owl loggerhead shrike Henslow's sparrow Bachman's sparrow	common loon osprey northern harrier American bittern red-shouldered hawk upland sandpiper roseate tern 24 species of songbirds	least tern American bittern white-faced ibis ferruginous hawk least tern Bell's vireo Baird's sparrow	snowy plover ferruginous hawk long-billed curlew upland sandpiper	red-shouldered hawk least tern Bachman's sparrow
<u>UTAH</u>	<u>VERMONT</u>	<u>WISCONSIN</u>	<u>WEST VIRGINIA</u>		
ferruginous hawk Bell's vireo	common loon northern harrier American bittern piping plover upland sandpiper 24 species of songbirds	common loon osprey red-shouldered hawk northern harrier piping plover upland sandpiper black tern barn owl loggerhead shrike	Bachman's sparrow		

Source: M. Shaffer, July 1982. Nongame Migratory Bird Species with Unstable or Decreasing Population Trends in the United States. OMBM and Patuxent WRC rept., USFWS. 8 pp.

Mr. SCHEUER. Thank you very much, Dr. Cutler. That was fascinating. All right. Now we'll hear from Dr. Faith Campbell of the Natural Resources Defense Council.

Dr. CAMPBELL. Thank you, Mr. Chairman. I do appreciate the opportunity to be here. I congratulate you on taking the leadership on this issue and hope that you and your colleagues——

Mr. SCHEUER. Well, this is a shared leadership of the three members of Congress you see here today. We work—it's a case where the whole is greater than the sum of the parts, so I know that was a collective thanks that you were giving.

Dr. CAMPBELL. It definitely was. Yes, sir. We are fully in agreement with you and the other sponsors of this bill, that something needs to be done to badger the Federal agencies into doing a better job.

Despite their testimony this morning, I think we all agree that they're not doing an adequate job. I have outlined in considerable detail in my written statement failures of particularly the Bureau of Land Management and the National Park Service, but that does not mean I think the Forest Service and the Fish and Wildlife Service are doing an adequate job; they're not.

You mentioned some problems with the ACEC program. I would also question the Bureau's claim of success or progress on the desert tortoise.

The Bureau manages 70 percent of the important quality habitat, if one could say it that way, for that species.

The species has declined 50 percent or more in most of those areas where it has been studied since the 1970's, and yet only now is the Bureau getting together with State directors to decide what kind of program it should follow to conserve the species and prevent its further decline.

It is much, much too early to see whether the program they come up with is going to have any meaning as far as the tortoise goes. To protect the tortoise, the Bureau is going to have to restructure its management of grazing, of mining, of human recreation in the desert. It is going to have to restructure everything it does in desert tortoise habitat and I wonder whether they're willing to do that.

I think it will be an interesting case study of whether their new lip service to biological diversity is going to have any focus.

Another area that I highlight in my testimony is the lack of adequate resources. Now, I focus on endangered species to a large extent and I agree with you that the endangered species program is the last ditch emergency program and we need to do a lot more for species before they reach that stage.

The failure of the administration and the Congress, however, to provide adequate resources for endangered species is symptomatic. If we can't get resources for those, I'm wondering how we're going to get resources for the others that are not yet in dire straits.

Finally, I would focus on Hawaii. Congressman Akaka, of course, spoke on that subject earlier and he is certainly right. It is the capital of biological diversity crisis for the United States.

I think one of the greatest tragedies is that some of Hawaii's remaining natural areas are owned by U.S. agencies, principally the National Park Service and the Fish and Wildlife Service, but nei-

ther of those agencies is providing anywhere close to the resources necessary to protect the species on those federally-owned lands.

The Fish and Wildlife Service this year provided a budget of \$170,000 for the Hakalau Forest National Wildlife Refuge, one that was just bought in the last 4 or 5 years with millions of dollars.

They're providing \$170,000 for management which is completely inadequate. That provides one full-time person based hours away as a staff.

They need at least \$1 to \$2 million right away to build fences to exclude—so that they can control goat, pig, and cattle populations inside the refuge.

Then they need hundreds of thousands of dollars per year in order to kill the pigs that are already in there or the forest will be completely ruined and the bird species will go extinct, despite the fact that it is named a national wildlife refuge.

Similarly, in the national parks, the funding provided at this point by a combination of Park Service requests and congressional add-ons, is about half of what is-needed at Haleakala and Hawaii Volcanoes National Parks to bring under control the pigs, goats, and the invasive exotic plants that are already in those parks.

The staff is working as hard as it—and both parks are working as hard as they can, but it's a very expensive endeavor.

I am puzzled why the National Park Service has chosen to highlight the southern Appalachians in their newfound emphasis on biological diversity.

I'm not denying that the southern Appalachians are quite diverse and have a lot of interesting species that need help, but the crisis is in Hawaii.

There's also a crisis in Virgin Islands National Park, having to do with both the forests and the reefs. And, again, the Park Service can't seem to find adequate resources to allow that park to control the human and other impacts that are destroying the biological resources of our tropical forest areas.

So I have not yet seen Defenders' testimony. If they have several pages of suggestions of ways to put teeth into the bill, I certainly will look at them closely and expect I would support them because I think the testimony of the three agencies here was that they find themselves in lawsuits and controversy.

I think the reason they're in controversy is because they haven't been doing an adequate job. The goal of your bill is to push them into doing a more adequate job.

The stronger the bill is, the more easily defined their tasks and, therefore, the easier it is for you and for conservation organizations to measure whether they're living up to those tasks, the more quickly we will see results.

Thank you.

[The prepared statement of Dr. Campbell follows:]

Testimony
before the
Subcommittee on Natural Resources, Agricultural Research,
and Environment
on
H.R. 4335
National Biological Diversity Conservation and Environmental
Research Act
Submitted by
Faith Thompson Campbell, Ph.D.
for
Natural Resources Defense Council

The Natural Resources Defense Council (NRDC) welcomes H.R. 4335 as a useful first step toward giving long-overdue attention to conserving biological diversity in our own country. We have important biological resources at risk here at home. Furthermore, effective conservation of these resources is essential to our leadership on conservation at the global level.

The findings outlined in H.R. 4335 are an excellent summary of the compelling reasons to conserve biological diversity and of the underlying problems which undermine this goal at present.

We are encouraged by the large number of co-sponsors. We hope that it signals involvement of additional committees -- especially those which have jurisdiction over wildlife programs and land-managing agencies. The Congress has a vital role to play in ensuring progress in conserving biological diversity. We believe this role requires principally more aggressive oversight, including during confirmation of executive branch appointments to key agencies; and larger appropriations. However, some new legislation may also be useful.

NRDC believes that a logical place to begin a national program to conserve biological diversity is with the lands and

programs under national jurisdiction. By any measurement, these lands include many areas of crucial importance to conserving biological diversity. Also, it should be easier to implement a national policy on them.

The Bureau of Land Management administers more wildlife habitat than any other federal agency: 270 million acres, or one-third more than the area managed by the second agency, the U.S. Forest Service. BLM lands harbor over 3,000 species of mammals, birds, reptiles, fish, and amphibians, plus an unknown number of plant species. Included are 206 million acres of habitat for big-game habitat, 233 million acres for small game, and 28 million acres for waterfowl. The wildlife on public lands includes about 140 species listed as endangered or threatened, among them about 87 animals and 53 plants. There are, in addition, approximately 620 plant species and 250 animal species under consideration for listing.

The U.S. Forest Service administers 191 million acres which shelter over 3,000 species of vertebrate wildlife and tens of thousands of plants and invertebrates. Currently there are 155 listed and proposed species on the national forests - approximately 31% of all listed species. In addition, there are about 630 candidate species, most of them plants.

In California, 870 sites have been identified as "significant natural areas" based primarily on biological criteria. Over half are on federal lands. Of these, only about 10% have been given protective designations by the responsible agency. Often, the agencies are not managing even those. The Nature Conservancy and state heritage programs in other states have identified similar sites on public lands in those states.

The National Park Service is still developing a program that will enable it to quantify the number of listed and candidate species found on NPS units. However, some lands are known to be vitally important. While publicity has focused on the grizzly bear in Yellowstone N.P. and the Florida panther in Everglades N.P. and Big Cypress Preserve, the parks with the largest number of unique species under threat are found in Hawaii.

Sadly, the U.S. land-managing agencies are ignoring or even misinterpreting the call to conserve biological diversity. Their failures fall into two categories: policies and priorities that either don't recognize the importance of conserving biological diversity or undermine it in practice; and lack of resources. The result, as outlined in H.R. 4335, is that existing programs are uncoordinated and inadequate.

Policies and Priorities

Unfortunately, the importance of conserving biological diversity has yet to influence the Nation's principal wildlife conservation agency, the Fish and Wildlife Service. Judging by recent public statements by Director Dunkle, FWS appears to be narrowing its focus more sharply to migratory game birds rather than looking at biological diversity broadly. The wetlands survey has been directed to look at wetlands of importance for waterfowl. In April, Director Dunkle told a press interviewer that he had asked managers of all national wildlife refuges to consider how they could help increase waterfowl production -- no matter for what purpose the refuge was established. What is good for ducks is not necessarily good for other species. Finally, the FWS has systematically downgraded the endangered species program.

Federal agencies, especially those with multiple-use mandates, should ensure that their programs do not contribute to loss of biological diversity on non-federal lands. This goal should already be met by a combination of environmental assessments conducted in compliance with the National Environmental Policy Act (NEPA) and Section 7 consultations under the Endangered Species Act (ESA). Unfortunately, the programs have not been so administered. Section 5(d) of H.R. 4335 seeks to address this gap with regard to NEPA. We suggest that amending NEPA is not necessary. Instead, Congress should instruct the Council on Environmental Quality to revise its regulations to be more specific about treatment of impacts on biological diversity. The Congress should further include an additional finding that notes that environmental impact statements have often ignored these impacts.

Both the Forest Service and BLM in practice give priority to commodity programs over needs of wildlife, much less plant, species. For example, BLM is not using its Areas of Critical Environmental Concern (ACEC) program systematically to identify and protect areas with great importance for sensitive species or high levels of endemism -- especially when such a designation might conflict with grazing or mining interests. BLM's State Director in Nevada even issued a policy that the agency would not designate ACECs for wildlife habitat. The BLM in Colorado has refused to designate literally dozens of areas identified by the state's Natural Areas Program. With the exception of Alaska, BLM has placed extremely few riparian systems in ACECs -- despite damage to these vitally important wildlife habitats from heavy use by domestic livestock. Even in Oregon, where more ACECs have been designated, there are disturbing questions about whether the ACECs are sufficiently large and whether the Bureau is actively trying to protect them. Some charge that BLM is trying to sabotage ACECs located on valuable timber lands by allowing logging inside their borders.

There is some evidence that this situation is beginning to change: the Forest Service has established a biological diversity task force, BLM is scheduling a meeting to explore the issue. But Congress needs to keep the pressure on. We should all judge the agencies on their performance, not just their rhetoric. One crucial test will be how they resolve the current public controversy over the management of two species that appear to require significant changes in major commodity production programs -- timber with regard to the spotted owl and grazing/mining with regard to the desert tortoise.

The desert tortoise is found in the American southwestern states and Mexico. The tortoise is long-lived, slow to mature and reproduce, and vulnerable to a wide range of disturbances. BLM manages about 70% of the best U.S. tortoise habitat so BLM bears primary responsibility for the species' survival in America. The desert tortoise has been listed as a threatened species in Utah; other populations are under consideration for listing under the Endangered Species Act.

Recent research at eight sites in California and others in Utah indicates that the species has declined significantly since the mid-1970's. The Bureau has yet not moved aggressively to counter this decline. Although BLM-sponsored research has shown the tortoise to be vulnerable to competition from livestock, crushing of tortoises themselves and destruction of vegetation by vehicles, and other human disturbances, grazing, orv recreation, and mining are allowed to proceed inside and adjacent to tortoise "crucial habitats" throughout tortoise habitat. BLM's Division of Wildlife is now working with state directors to devise a proper management plan. It is far too early to predict whether that plan will result in real changes in the public's use of the desert to give the tortoise a chance to survive.

Lack of Resources

A key component of a program to conserve biological diversity must be an effort to prevent extinction of those species already on the brink. While the endangered species program was created two decades ago, it has never had adequate resources. FWS' appropriation to implement the Endangered Species Act constitutes only four percent of the FWS budget, [Katherine Barton, "Federal Fish and Wildlife Agency Budgets", Audubon Wildlife Report 1987, p. 329] nine percent if one excludes the permanent trust fund accounts (Pittman-Robertson and Dingell-Johnson) and land acquisition. The National Marine Fisheries Service devotes an apparently similar proportion of its research and habitat conservation funds to this purpose. [Katherine Barton, "Federal Fish and Wildlife Agency Budgets", Audubon Wildlife Report 1987, pp. 351-2]

A coalition of 32 conservation organizations believes funding should be nearly \$100 m -- three times higher than present levels -- in order to provide sufficient staff to list 3,000 candidates waiting for protection of Act; and devise and carry out protective programs to restore them to sustainable population levels.

These recommendations do not include funding for land acquisition and management -- crucial parts of any conservation program.

The Forest Service has just begun a badly needed effort to upgrade its program to conserve the nearly 800 threatened, endangered, and candidate species found on national forests and grasslands. The FY1988 appropriation for the Forest Service' wildlife habitat management program was \$47.65 m, of which \$4.49 m was for threatened and endangered species. The Administration's request for the Forest Service for FY1989 is \$45.410 million, of which only \$2.180 million is for endangered species. This request is inadequate, particularly with regard to endangered species and fish.

The inadequacy is seen in the Forest Service's failure to even carry out its legal responsibility under the Endangered Species Act. Of 155 listed species, 82 have recovery plans. Nevertheless, the Forest Service has traditionally limited its program almost exclusively to a few species. The Service is now trying to devote more resources to endangered species.

BLM is in a similar situation, exacerbated by inadequacy of overall funding for its wildlife program. BLM's FY1988 appropriation is \$18.4 m; worse, the President's budget for FY1989 asks only \$14.8 million for the BLM program, only one-third of the request for the Forest Service. The amount for the 1,000 endangered, threatened, and candidate species is \$4.3 m. Two years ago, 73 recovery plans had been completed for the 140 listed species on the public lands; an additional 12 plans were then being developed, and may now be ready for implementation. Of these, the Bureau was carrying out some of the recommendations of 56 plans. Another 54 species still lacked plans; the Bureau should be prepared to assist in their development and then implementation.

Director Burford endorsed last year a strategic plan for BLM's wildlife program, Fish and Wildlife 2000. "Goal 1" of the strategy is to "(e)nsure optimum populations and a natural abundance and diversity of wildlife resources on public lands by restoring, maintaining, and enhancing habitat conditions" Clearly, the Bureau's budget has not been adjusted so as to make possible reaching the plan's goals. The principal action

mechanism of BLM's wildlife program is the Habitat Management Plan (HMP). Due to historic inadequacies of funding for the Bureau's wildlife program, the Bureau already has a backlog of \$63 million worth of HMP activities that have not been carried out due to lack of funds and staff.

Nor does BLM provide adequate funding or staff to control threats even in wildlife habitats included in ACECs. A recent informal survey indicated that about 30% of ACECs are suffering from inadequate resources.

Species which are not considered endangered or "game" have been neglected even more. The FWS' non-game program has never been funded.

In building a national program to conserve biological diversity, we must ensure that the federal agencies work closely with and support those organizations that are decades ahead in this field -- the Nature Conservancy, state natural area programs and heritage programs. These agencies already have the best available databases. Future efforts should focus on expanding them and filling the gaps, not duplicating them. Federal agencies rely on their help to build programs for federal lands.

This need for cooperation holds true for research and public education as well.

Thanks to efforts of the Nature Conservancy, academic biologists, and others, we already know key ecosystems on which the Nation could focus now. While we need more research to identify additional centers of endemism or relicts, and particularly to develop management programs, that is no excuse not to deal with identified crisis areas.

The highest priority are the small areas of the United States found in the tropics -- Hawaii, Puerto Rico, and the Virgin Islands. These islands include areas that retain significant fragile remnants of natural biological communities. These remnants are under severe threat -- especially in Hawaii, where invasions of invasive exotic animals and plants proceed regardless of legal protection.

The Subcommittee has already heard much about Hawaii from Representative Akaka. NRDC concurs with the priority he gave to his home islands. The conservation crisis in Hawaii is dire. Ninety-five percent of all native Hawaiian terrestrial species and subspecies are endemic -- the highest level of endemism for any area in the world. Evolutionary biologists consider Hawaii to be at least as important to understanding evolution as Darwin's fabled Galapagos Islands. Island organisms often are particularly vulnerable to extinctions caused by activities of

humans or the animals and plants they bring with them. An unfortunate consequence is that about three-quarters of all Hawaiian species of birds, half the plant species are already extinct or endangered, and the same is probably true for the Islands' terrestrial and freshwater invertebrates. Both of Hawaii's native land mammals -- a seal and a bat -- are also endangered. The native reptiles -- sea turtles -- are also threatened. Hawaii has no native amphibians.

Some of Hawaii's remaining natural areas are owned by U.S. agencies, but they need to step up protective efforts to prevent these habitats from being destroyed by invading pigs, goats, and exotic plants. Unfortunately, these important publicly owned habitats currently serve as case studies of the government's failure to do what is necessary.

The FWS must provide additional funds to manage the Hakalau Forest National Wildlife Refuge on the slopes of Mauna Kea, which protects the habitat of 5 endangered bird species as well as other birds endemic to Hawaii's shrinking wet forests. Without significant increases in funds to fence the refuge, eliminate pigs and cattle, control invading alien plants, and restore the native forest, Hakalau refuge will rapidly lose its value as bird habitat. The refuge has a budget of only \$170,000 for FY1988 -- thanks to a Congressional add-on. The Administration's request for FY1989 includes only \$651,000 for management of all 14 refuges in the Hawaii Islands Complex -- half the current figure. In order to preserve the value of Hakalau Refuge, the FWS needs over \$1 million to build 60 to 70 miles of fence to control inroads by cattle and particularly feral pigs; and a permanent, on-the-ground staff to maintain the fence and carry out eradication programs -- at a cost of about \$700,000 per year. Once the fence is built, need annual maintenance budgets in the \$1 million range.

The FWS is also negotiating to purchase Kilauea Ranch and "Forest Reserve" bordering Hawaii Volcanoes N.P. This area contains the best remaining koa forest on all the islands and is thus key to survival of several bird species. Assuming this acquisition proceeds, the new refuge will need a similar management budget, perhaps reduced somewhat by the fact that the refuge will share a border with Hawaii Volcanoes N.P., which has complementary management objectives.

The National Park Service, despite giving new attention to its role in conserving biological diversity, has not put adequate priority on the parks units in Hawaii -- those with the highest levels of species endemism and least chance that the species will survive outside the parks.

Haleakala National Park, particularly its Kipahulu District, is the highest priority area in the entire National Park system from the perspective of conserving biological diversity. Invasion of the area by feral pigs and goats now threatens its destruction. Hawaii Volcanoes National Park has advanced further in ungulate control. However, it is threatened by exotic (alien) plants, which are smothering native vegetation. These resources, the threatened destruction, and needed conservation programs are described in greater detail in Annexes 1 and 2.

Each park requires a natural resource management budget of about \$700,000, plus research funding of \$250,000. These funds must be in Park Base, not taken from fee income or other sources, so that permanent staff may be hired to carry out these continuing programs.

Virgin Islands National Park also protects tropical ecosystems that are on the verge of disappearing outside Park boundaries. The forests of the Park represent the most extensive protected forests in the all the Virgin Islands and thus are vitally important habitat for both resident and migratory animals, including the nearly extirpated iguana and migratory birds. The Park's coral reefs are spectacular; its sea grass beds and beaches provide feeding and nesting habitat for threatened green sea turtles.

The Park's scandalously low natural resources management budget -- \$67,800 in FY1988 -- prevents the staff from responding to these threats. Virgin Islands National Park requires a resource management budget, in base funds, of about \$183,000.

A second key ecosystem requiring urgent attention is wetlands. While wetlands have recently received greater attention from federal agencies, there has been an unfortunate tendency to value them only for production of waterfowl and commercial fish species. Many other types of wetlands have important biological communities, such as the pitcher plant bogs of Gulf of Mexico coast and desert spring systems of Intermountain west.

Mere remnants remain of the prairies (natural grasslands), virgin forests, and healthy deserts which formerly occupied such large parts of our country. In virtually all cases, large mammals have disappeared from these biological "islands". However, they need to be identified and protected to save the remaining species.

Needed Legislative Changes

The Congress should consider amending the 1872 Mining Act and other statutes that give absolute priority to other activities on public lands and preclude agency efforts to protect biological diversity. It should consider an organic act for FWS that would clarify that agency's responsibility for conserving biological diversity, not just the limited number of species -- migrants and endangered species -- currently under its jurisdiction. Specifically, FWS lacks authority over plant species until they have been listed as endangered or threatened. Even then, the Endangered Species Act offers fewer protections to plants than to animals.

Regarding private lands, the Congress should consider reducing tax subsidies for activities with negative impacts on lands of identified biological richness. Senator Chafee suggested several such changes in 1986.

The principle need is for Congress to mandate a high priority for conserving biological conservation, and provide the resources necessary. Our testimony has touched on only a few of the many competing calls for expanded biological research. Funding and staff are already inadequate to carry out existing programs. NRDC supports a broadened effort, but it must come with increased resources.

Annex 1
Haleakala National Park
Endangered Biological Treasures
of the
Kipahulu District

The Kipahulu valley below 2,000 feet is already completely altered by the invasion of exotic plants. Heroic efforts will be required to halt on-going degradation of the valley and neighboring areas at elevations above 2,800 feet; any delay would lead to irreparable loss of native ecosystem components.

The area is extremely rich botanically. The native Koa (*Acacia koa*) and Ohia'a (*Metrosideros collina*) forests of the valley contain tree ferns (*Cibotium* spp.) and rare, sometimes spectacular endemic lobelioides (*Cyanea* spp., *Clermontia* spp., and *Trematolobelia*) and mints (*Stenogyne* spp. and *Phyllostegia* spp.) The upper portion of Kipahulu Valley is habitat for several federally listed endangered honeycreepers, some of them thought to be extinct until rediscovered here. The rarest are the Maui Nukupu'u (*Hemignathus lucidus affinis*), the Maui parrotbill (*Pseudonestor xanthophrys*), and the endangered 'Akohekohe or crested honeycreeper (*Palmeria dolei*).

Feral pigs are rapidly converting central Kipahulu Valley from the near-pristine area it was as recently as the 1960's to a degraded condition with a progressively decreasing abundance of native species (which pigs prefer) and an increasing abundance of exotics. As of 1985, the worst damage has occurred below 2,600-2,800 ft. elevation. Considerable potential for ecosystem recovery exists if feral pigs are substantially reduced or eliminated.

The neighboring Kuiki/Manawainui Planeze is the least known and potentially richest area biologically in the park. Rare plants found there include *Argyroxiphium virescens* var. *virescens*, *Lobelia gaudichaudii*, and *Keysseria lavendul*. The endangered 'Akohekohe or crested honeycreeper occurs in the *Metrosideros* forest. Feral goats' and pigs' activities on the summit of Kuiki and the western margins of the Kuiki Planeze have locally resulted in loss of most native vegetation and severe

Annex 1

- 2 -

soil loss (as much as six feet of soil and cinder subsoil have been lost in some locations).

The upper Hana rainforest and associated bogs support extremely important plant communities and endangered birds. The extremely interesting, rare and fragile bog flora includes the Haleakala greensword (Argyroxiphium graycinum), a violet endemic to Maui, an endemic geranium, and others. Windswept, treeless areas adjacent to these bogs also support an interesting flora including several very rare lobelioids. The rainforest and adjacent state land is the habitat of the po'ouli (Melamprosops phaeosoma), a highly localized endemic bird genus first discovered and described in 1973.

The Kipahulu District contains part of Kalapawili Ridge, the site of the only high elevation native grassland area in the Hawaiian Islands; it also is the site of the highest elevation bog in the state. Pig exclusion fences have been completed and the area is recovering.

In summary, with the notable exceptions of portions of the upper Hana Rainforest bogs, the Kalapawili Ridge grasslands, and the western margin of the Kuiki Planeze, the zone above 4,000-ft. elevation is still largely intact, with few exotic plant species and probably with little reduction in abundance of most natives. The 2,800-4,000 ft. zone of Kipahulu is even richer botanically, but has suffered more from invasion of exotics.

In view of these riches and the threats to them, protective management of the Kipahulu District is the highest priority project in the National Park system.

The most immediate management action needed is elimination of feral pigs through fencing and shooting, trapping, or poisoning. Haleakala N.P. staff have begun a six-year protection program to realize this goal. The first phase, construction of three barrier fences in the valley, should be completed by the end of FY 1987.

It is now essential to remove pigs in Zones 1 and 2; this program must reduce pigs by at least 70% per year in order to obtain a real reduction. Concurrent monitoring of pig densities is necessary to guide the removal effort. Haleakala staff should emphasize the most effective methods of pig control techniques and not allow pressure by hunting or humane groups to influence the choice. Helicopter support will be needed. Four additional temporary shelters (upper Hana Rainforest bogs, Kaumakani Ridge, and two in the lower valley) will greatly facilitate control efforts. Other requirements include a support

Annex 1

- 3 -

vehicle, pig traps, weapons, and materials for fence maintenance and shelter maintenance. Funding needs are a one-time appropriation of \$132,000 in FY 88, primarily for personnel; and \$57,000 in Park Base funding for fence maintenance.

Efforts should also begin to control strawberry guava and other selected exotics in the fenced management zones and upper Hana Rainforest management zone. The level of funding needed is \$80,000.

In the more heavily visited Crater District of Haleakala N.P., the staff must maintain fences already built. This work requires \$30,000 already in Park Base funding. Goat and pig removal must be accelerated at a cost of \$70,000. Again, the Park staff should choose the most effective approach without consideration of its impact on sport hunting.

Annex 2

Hawaii Volcanoes National Park
Control of Invasive Exotic Plant

Of the approximately 475 exotic plant species occurring in Hawaii Volcanoes, over 40 species are capable of growing at disruptively high densities or of forming monotypic infestations. Even at lower densities, some non-native plants degrade native ecosystems by changing fire, nutrient cycling, and soil-water regimes. As plant composition shifts, native ecosystems are replaced by exotic ecosystems. Even maintaining existing native plant communities requires resources considerably beyond present staffing and funding levels.

Much of the coastal lowland vegetation is already predominantly exotic, and exotic biota are important in the lower Ohi'a woodlands. Upper rainforest, mosaic forest, scrublands, and grasslands are mostly native. Plant communities above 4,800 feet elevation are essentially intact. However, even the most intact plant communities are threatened with radical alteration, frequently by more than one introduced plant species capable of forming single species stands or vegetation layers.

Hawaii Volcanoes N.P. staff have developed a program that can be carried out with realistic funding levels. The Park is already preventing the spread of additional exotic species into Park ecosystems by controlling 38 species of highly localized exotics and new introductions through a vigilant monitoring program.

The Park should expand on-going efforts in Special Ecological Areas (SEA's) to control widespread exotic species that cannot be controlled Parkwide because of lack of resources. The staff are now removing exotics found in 5 SEAs. An additional \$20,000 are required to meet this project's goals. In most of the remaining 12 SEAs, monitoring should be sufficient.

Research is needed on conventional or biological controls of troublesome widespread exotics -- the method chosen to depend on costs, feasibility, and impacts on non-target species. The species given highest priority for such research would be Myrica faya (Firetree), Passiflora mollissima (Banana poka), Rubus ellipticus (Yellow raspberry), R. glaucus (Raspberry), R.

Annex 2

- 2 -

penetrans (Blackberry), Andropogon glomeratus (Bush beardgrass), Andropogon virginicus (Broomsedge), Melinis minutiflora (Molasses grass), Pennisetum setaceum (Fountain grass), and Psidium cattleianum (Strawberry guava). To begin exploring the promising prospect of utilizing pathogens, NPS must fund a "secure" laboratory that would prevent escape of experimental microbes. Costs could be several hundred thousand dollars -- but successful use of these methods would eliminate many of the Hawaiian National parks' resource problems.

Other projects should be undertaken as soon as possible. These include research on native plant species' tolerance of fire and further research on the threats posed by exotic plants.

The Park staff should emphasize exotic plant control and habitat improvement rather than rare plant management and planting native plants. This is ecologically justified by the fact that habitat improvement almost invariably results in the reproduction of rare plants. In the coastal lowlands where native seed sources have been depleted, an experimental planting program may be undertaken if funding allows. Recovery plans for rare plants failing to reproduce will be developed as funding permits.

Mr. SCHEUER. Thank you very much, Dr. Campbell. I'm going to yield the Chair to Congressman Brown, a great contributor to the work of this subcommittee, and a great statesman, correct.

I hope to be back to relieve him by 12.

Mr. BROWN. Mr. Flamm.

Mr. FLAMM. Thank you, Mr. Chairman.

The Wilderness Society would also like to commend the chairman and the committee for this hearing, for the bill and the very impressive understanding of the biological diversity problem both in this country and worldwide. I think because of that and because of the previous testimony, I won't describe the problem, except to add our voice to the chorus that a national diversity policy is desperately needed by this country.

We lack this policy and if you have ever had any doubt that we need a policy, I think the Agency testimony this morning certainly illustrated the need. The legislation is extremely important because it does establish for the first time a comprehensive policy which would direct both our national and our international concerns.

We are also very pleased that there is a requirement to expressly address biological diversity and effects on biological diversity in the EIS process.

We think that the first step definitely is to get the Federal house in order. In spite of Chief Robertson being afraid of what the impacts might be on his agency by this bill, we are afraid that the bill maybe is too general and wouldn't have an impact upon their programs at all, because, believe me, we need to impact upon the programs of these land management agencies.

The Wilderness Society spent considerable effort in the last few years, particularly on the Forest Service programs, and the Chief may brag about the coordination in the great Yellowstone ecosystem, but you ought to see what is actually happening on the ground: clear cutting, road-building, oil and gas leasing that's having severe impacts, which is fragmenting the habitat, eliminating critical habitat for the grizzly bear and the future plans are even worse.

Like my colleague, Dr. Cutler, we think there needs to be a mechanism or more bluntly, teeth in the bill, and I offer a few teeth for your consideration, very briefly.

First of all, in taking license from some experience in the early implementation of the National Environmental Policy Act, we would suggest that after passage of this very needed bill that there be a requirement that Federal agencies, all Federal agencies, look at their programs and do a program review and see what they are doing that is inconsistent or consistent with the provisions of the act. This finding should be reported to the President and to the Congress.

Now to the extent that they have authority to bring their programs into line with the purposes of the Act, then by all means that ought to be done, and if they feel they don't have authority, then we suggest that they ought to submit legislation to correct or change their program to bring it into line with the purposes of the Act.

A last resort, one I don't find attractive, but realistically there probably are some programs that will be inconsistent, for matters of national security or whatever, that we may still want to proceed on, but those ought to be carefully justified.

So that would be my first tooth in this proposal.

The second is on the EIS oversight. I think you ought to make sure there is some agency watching that and right now EPA has general responsibility and I would assign some very specific responsibility to make sure this is not done in a way that is just meaningless.

Third, any new programs and new project proposals, particularly project proposals, ought to be subject to high level review if the EPA or if a Department head or if a Governor of a state found serious problems or thought that the program would have series effects on biological diversity. We suggest that the President's Council on Environmental Quality would be the appropriate body to handle this review and report findings and delay actions until the review was completed.

We would like to make clear that we think it's important that these provisions be applied to both domestic and to foreign programs. This was always a question and some difficulty with NEPA and I think this ought to be clarified from the outset with this bill. I definitely would recommend that it include both parts.

We think these provisions would aid in the implementation of the fine purposes of the act. One problem, of course you will need to develop some guidelines as to what really constitutes adverse impact on biological diversity and in my written testimony I make some suggestions as to that. You could have too lenient a definition that would make the bill meaningless or too tough a one would just cause unnecessary problems.

Finally, there is much to be learned about biological diversity. We already know a great deal, but I think the Federal land inventories are largely really inadequate. They have dealt with commercial timber or with range forage. Much isn't known, so a comprehensive biological inventory is very much needed. We think at this time that this could be done with existing institutions, if they were given really strong, clear direction and we think perhaps the Smithsonian could coordinate this.

Finally, in the bill there ought to be very clear responsibilities established for the agencies to meet the policies and purposes of the act. We feel that that needs to be clarified and that probably an oversight function would be that the CEQ would be a good source for this continuing oversight of the bill within the administration. That completes my comments. Thank you.

[The prepared statement of Mr. Flamm follows:]



THE WILDERNESS SOCIETY

STATEMENT OF BARRY FLAMM, CHIEF FORESTER FOR THE WILDERNESS SOCIETY, BEFORE THE HOUSE SCIENCE, SPACE, AND TECHNOLOGY COMMITTEE, SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURAL RESEARCH AND ENVIRONMENT, ON H.R. 4335, THE NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND ENVIRONMENTAL RESEARCH ACT, JUNE 9, 1988.

Mr. Chairman, my name is Barry Flamm, Chief Forester for The Wilderness Society. With more than 226,000 members nationwide, The Wilderness Society is dedicated to the protection and wise management of our public lands. We are strongly committed to the preservation of biological diversity on those lands and are deeply concerned about the unprecedented rate at which diversity is being lost, both in the United States and throughout the world.

Quite simply, biological diversity is the diversity of life. Its three principal components are:

- o ecosystem or community diversity, reflecting the distinctive assemblages of species that occur in different physical settings and in different parts of the world;
- o species diversity, reflecting the richness and variety of living species that inhabit the world; and
- o genetic diversity, reflecting the differences in genetic composition among individuals or between populations of a given species.

In relation to biological diversity, we are in the midst of a "quiet crisis" -- quiet because it rarely appears in the headlines or makes the evening news programs. But every day, throughout the world, more acres of wildlands are destroyed, more species are pushed closer to extinction, and unique and irreplaceable genotypes are extinguished. Many scientists predict that over the next few decades, human destructiveness will cause the extinction of more species than at any one time since the demise of the dinosaurs 65 million years ago.

The Wilderness Society commends you and the committee for your concern about the loss of biological diversity, for introducing H.R. 4335, and for this important hearing. We strongly believe that new legislation is needed to address this crisis. We support the goals and objectives of H.R. 4335. The proposed legislation is important because it makes the preservation of biological diversity a national policy. Also, we are pleased that the legislation requires that biological diversity be fully described and that all anticipated impacts on natural biological diversity from proposed actions be explicitly addressed in environmental impact statements (EISs). We feel, however, that there are several ways in which the proposed legislation can be strengthened and improved.

In our view, a major weakness of the current bill is that it lacks a mechanism to require compliance with the policy statement and provisions of the National Environmental Policy Act (NEPA). We recommend that all federal agencies be required to review their programs to determine whether they are consistent with the national policy on biological diversity and that the results of this review be reported to the President and Congress. A similar program review was required following passage of NEPA, with useful results.

For programs found to be inconsistent with The National Biological Diversity Conservation and Environmental Research Act, the agencies should:

- o modify the programs to conform to the act, if modification is within the agency's authority;
- o submit legislation to bring its actions into accord with the act; or
- o submit a statement in the annual budget supporting and justifying the continuation of the program in question in light of its adverse impacts on biological diversity.

The responsibility to ensure that all EISs contain the mandated diversity descriptions and analysis should be expressly assigned to a federal agency, such as the Environmental Protection Agency (EPA). The EPA already has responsibility under Section 309 of the Clean Air Act for reviewing and commenting on agency actions subject to NEPA. At the request of the EPA, an agency head, or Governor, the Council on Environmental Quality (CEQ) should review any major federal actions that are likely to have an adverse impact on biological diversity. All major

federal actions requiring EISS should be consistent with the National Biological Diversity and Environmental Research Act. However, if this criterion cannot be met, the agency should fully justify the action in light of its adverse impacts. Furthermore, to avoid, minimize, or mitigate the loss of biological diversity, the CEQ should be given authority to delay a proposed action until it has reviewed the impacts and the President has acted upon its recommendations.

For such a process to be effective, the legislation must contain guidelines as to what constitutes an "adverse impact" on biological diversity. On a cautionary note, too strict a definition might needlessly inhibit actions; too lenient a definition would vitiate the purpose of national biological diversity legislation. Thus, as a starting point for discussion, we propose that federal actions be considered to have adverse impacts on biological diversity if they are likely to create: (1) losses of regionally rare, native animal or plant species or scarce natural floral and faunal communities, or (2) losses of fish, wildlife or plant species or natural wildland communities that have already shown significant declines over a sizeable portion of their historic range.

In addition to strengthening the NEPA-related provisions of the bill, we believe other sections also can be improved. Given the current budget deficit, our preference is to avoid creating new institutions when existing ones can accomplish the same goals. As presently conceived, H.R. 4335 creates two new committees -- a National Scientific Advisory Committee on Biological Diversity and an Interagency Working Committee on Biological Diversity -- and a new National Center for Biological Diversity and Environmental Research. We do not believe these institutions are necessary in order to accomplish the goals of the proposed legislation.

Existing institutions can carry out the mandate of the act, if they are provided with clear direction and assignments. The CEQ should be given the oversight responsibility for reviewing federal programs and policies to ensure they are consistent with the policy statement. Because the CEQ has the authority to form whatever interagency committees it feels are necessary, creation of a new, independent Interagency Working Committee on Biological Diversity is unnecessary. The CEQ, as well as other federal agencies, also has ample authorities to consult with non-governmental scientists and other interested parties; therefore, we believe that a permanent National Scientific Advisory Committee on Biological Diversity is not needed.

Finally, the functions of the proposed National Center for Biological Diversity and Environmental Research can also be carried out by existing institutions or through collaborative efforts among existing institutions. We recognize the need for an adequate biological inventory of U.S. public lands; there is a need for a standardized database for all of this nation's flora and fauna and their habitats, and an inventory to discover and delineate the locations of uncommon or unusual fish, wildlife and plant species or floral and faunal communities. Without this information, many of our best wildland communities, rare species, and special places may be destroyed unintentionally. We believe that such an inventory, to identify and fill significant gaps in our biological knowledge of the public lands, is best accomplished by providing funding for a specified, collaborative effort between the Smithsonian Institution, the federal land management agencies, and other appropriate agencies. In turn, they could obtain information and assistance from private organizations or state natural heritage programs that have expertise and data on biological diversity.

Mr. Chairman, your committee is tackling one of the most serious but least recognized problems facing our country. The Wilderness Society is convinced that a strong National Biological Diversity Conservation Act is needed and would represent a milestone in efforts to stop the relentless loss of biological wealth. We thank you and the committee for this important effort.

Mr. BROWN. Thank you very much, Mr. Flamm. Mr. Pissot.

Mr. PISSOT. Good morning, Congressman Brown, Congresswoman Schneider. My name is Jim Pissot. I am a Wildlife Policy Specialist with the National Audubon Society. I am pleased to be here on behalf of the Society in support of H.R. 4335.

I am particularly encouraged by the opening remarks of today's hearings. I think that no more needs to be said regarding the crisis that we are facing today.

In his essay on wilderness in a Sand County Almanac, Aldo Leopold wrote:

In 1909 when I first saw the West, there were grizzlies in every major mountain mass, but you could travel for months without meeting a conservation officer. Today there is some kind of conservation officer behind every bush, yet as wildlife bureaus grow our most magnificent mammal retreats steadily toward the Canadian border.

Today we have volumes and volumes of legislation and regulations and good intentions designed to protect the environment. Yet at this moment we face an unprecedented ecological crisis. This irony is as real and dramatic today as the one Leopold observed in the forests of the White Mountains.

We can be proud of our successes and I share the pride of the agencies when they highlighted some of those in earlier testimony. Our systems of parks, refuges and wilderness areas, our system of laws and regulations are encouraging. We thrill to flap of bald eagles, peregrine falcons that are in the process of recovery and daily news regarding California condors and black-footed ferrets brings good news to us all, but as my dad said when I brought report cards home, he just didn't want to see the good grades.

We also have 500 species on the threatened and endangered list. We have 3,900 candidates that qualify for listing. We have only recovered four species in the entire endangered species program, and yet six have gone extinct during that time.

Our waterfowl and shorebird species, a number of them, are in serious and mysterious decline. We have species vanishing from our national parks regardless of size. Sixty percent of our range land is currently in unsatisfactory condition and we have national wildlife refuges without water rights that are drying up and luring birds to toxic pools of death. All of this is occurring in spite of a wealth of laws designed to protect individual species, ecosystems, and in the sense of the gentlemen from the agencies that testified this morning, designed to protect biological diversity.

We feel that in order to protect diversity, four steps are incredibly necessary.

The first is that, as stated in the language of H.R. 4335, we must state that the conservation of biological diversity is indeed a national priority.

Second, the existing laws and programs must be enforced and must be adequately funded.

Third, we need dynamic and dedicated leadership in our Federal agencies that are charged with preserving biological diversity in a variety of programs.

Fourth, since public input is a major facet in our land management program, as was stated forcefully by the gentleman on the panel earlier, we must have a strong public education program so that the public understands the value of biological diversity, the

subtle and cumulative threats to diversity, and the real prices of goods and services that we all enjoy.

Again, we are encouraged by success and particularly the National Park Service's education program that's been initiated, and the Forest Service Steering Committee on biological diversity. We don't doubt the success or the dedication of individuals within the agencies, but success doesn't imperil species or communities or ecosystems. Failure and neglect do.

I would like to take a moment to highlight at least one example that the National Audubon Society is particularly concerned with in the field of failure and neglect. This involves the National Forest System, although I think examples of both success and failure could be cited in any number of our Federal agencies.

The Forest Service is responsible for the habitat of over 3,000 wildlife species. It controls habitat supporting 185 listed threatened and endangered species and has identified over 700 species that are listed as sensitive. The Forest Service lands support 33 million user days of recreation and the hunting and fishing value of recreation is valued at over \$650 million.

In spite of these impressive facts, less than 2 percent of the Forest Service 1988 budget was spent on fish and wildlife resources. We feel that fish and wildlife play an extremely minor role in the policy decisions of the Forest Service and we feel this ought to be corrected.

One example I would like to cite in the Pacific Northwest, in regions 5 and 6 of the Forest Service, is the northern spotted owl. The owl has been selected as a management indicator species, which means that the Forest Service is monitoring the species as an indicator of the health of forest habitats. It has established habitat areas that the owl uses and that will be protected so that the owl distribution in numbers will be maintained throughout the forest system.

The problem is that owls nest in areas that are also valuable in commercial timber. I would like to note the results of the Forest Service program to preserve owls and also take advantage of commercial timber in the forest in a report from the Washington Department of Wildlife biologist Ms. Harriet Allen. Ms. Allen wrote,

Many of the network sites, that is, those sites that are set aside for spotted owls are not in the right place. There has been an effort to put sites where they will have the least impact on timber harvest. The result is a situation of habitat sites without owls: 21 percent of the network sites don't have any owls in them and owls without habitat sites—47 percent of the known owls do not have a habitat site designated. Sites that are not known to have owls in them are being retained in the protection network, while owl nesting sites that are known are being logged.

We understand the role of the Forest Service in trying to balance short term and long term economic needs and the variety of uses that again were explained this morning, but we feel that the attempt to designate spotted owl areas, areas set aside for a management indicator species that have "the least impact on timber harvest" is a violation of the Forest Service mandate to maintain biological diversity under their own regulations and their own program. In fact, this is not biological diversity. We call it biological perversity.

It appears that the Forest Service is attempting a form of accelerated unnatural selection. Perhaps they are trying to breed a new race of spotted owl that will survive in small, fragmented patches of spindly trees, and seen another way, perhaps this is an attempt to add a new twist to biological diversity.

The Forest Service's threatened and endangered species program was addressed at a recent workshop that involved forest supervisors and those in charge of the threatened and endangered species program. We were very encouraged by the results of that workshop and were pleased to participate in it and make recommendations. The Agency appears to be seriously prepared to begin to upgrade its existing program, which we find is good news. The bad news is that the Endangered Species Act has been on the books for 15 years and while there are individual examples of success within the Forest Service, there has not to date been an aggressive coordinated program to protect threatened and endangered species and recover them on national forest land.

As the chairman was questioning the possibility of a coordinated program for biodiversity, I would suggest that we look at what the Forest Service and other agencies have done as far as a coordinated, integrated program on threatened and endangered species and response to a piece of legislation that has been on the books for 15 years.

My written comments also contain some remarks regarding the U.S. Fish and Wildlife Service. Let me just quickly summarize those. There seems to be substantial evidence presented that decisions regarding jeopardy opinions on projects that impact threatened and endangered species appear to be made before biological review, as required in the regulations. The National Audubon Society has requested a congressional investigation of these allegations and we look forward to the results of those investigations.

Regarding the specifics of H.R. 4335, we find that the findings portray accurately the current crisis. Regarding education—in section 4—we feel that the role of public education cannot be overemphasized. Again the agencies must respond to public input and if the general public does not understand the role of biological diversity and the cost of resource extraction and other activities on our public lands then we are not going to have the kind of positive, supportive input that the agencies require.

I realize that the Federal role in this field is somewhat limited and I am not sure exactly how the Congress or the Federal Government can address this, but I suggest that it is a serious problem. The university which I attended offered only one section in one term in a course in—excuse me one second—in environmental studies.

On the other hand, some schools offer environmental studies as an entire major. We urge that specific language be included in the bill to support, encourage and lead our educational institutions, our public and private media, particularly public television, museums and other opportunities for public education.

We support the requirement that biological diversity become an element of the National Environmental Policy Act and we urge that the guidelines be more defined and quantified in response to a number of the comments we have heard today. Inclusion of this

section would make environmental action proactive and would provide protection prior to Endangered Species Act triggering.

With respect to enforcement in section 5, we would be glad to work with the Committee to develop language specifying that federal actions substantially or significantly decreasing the species or habitat viability would be a violation of the act. We feel that enforcement is necessary, but again we feel the language must be worked out more specifically and we'd be glad to be a part of that system.

We know that ecosystems will be exploited and we know that resources will be used, but we think that we can devise systems to mimic natural processes as much as possible.

The Audubon Society strongly endorses testimony that was received last year by this committee regarding the boards and committees that would administer and define a variety of aspects of the program on biological diversity conservation. We support the recommendation that representatives from medicine, industry, agriculture, science and finance be a part of those committees. The national program to preserve biological diversity requires broad support and we feel that those elements of society that benefit most obviously and directly and which will be threatened most obviously and directly ought to be a part of that program.

In our written testimony, we have urged that a number of additional agencies be included in the inter-agency cooperation team, and I urge the committee to take a look at that list.

I would like to make just a couple of last closing suggestions regarding, I think, the attitude we have to have, that we have to change along with changing of our laws and regulations. When human populations were small and technology was primitive, we didn't have to worry about these situations nearly so much, but now that we can modify the systems of the planet to such an extreme degree, I think it is time that we begin to look at a lot of them in a different way.

Perhaps we should consider, for example, a sustained yield of spotted owls or desert tortoises or red cockaded woodpeckers in addition to our stated management goals of sustained yield of board feet or animal unit months of grazing on our public lands. Perhaps a benefit cost analysis could be made in the real currency of biological diversity and ecosystem integrity, not merely in the abstract and symbolic currency of dollars and cents.

This act's emphasis on conserving biological diversity should produce immediate and tangible results as well as stimulate some additional debate on future management.

In "The Land Ethic", Leopold also told us that "a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." A comprehensive and coordinated strategy to conserve biological diversity is clearly the right thing. We strongly endorse and support H.R. 4335 and would be glad to participate with the committee in further debate.

[The prepared statement of Mr. Pissot follows:]



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TESTIMONY OF JAMES H. PISSOT

WILDLIFE SPECIALIST

NATIONAL AUDUBON SOCIETY

CONCERNING

NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND
ENVIRONMENTAL RESEARCH ACT
H.R. 4335

SUBMITTED TO THE

SUBCOMMITTEE ON NATIONAL RESOURCES, AGRICULTURE
RESEARCH AND ENVIRONMENT

COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

JUNE 9, 1988

Recycled Paper

In his essay on "Wilderness" in A Sand County Almanac, Aldo Leopold wrote, "In 1909, when I first saw the West, there were grizzlies in every major mountain mass, but you could travel for months without meeting a conservation officer. Today there is some kind of conservation officer 'behind every bush,' yet as wildlife bureaus grow, our most magnificent mammal retreats steadily toward the Canadian border." Today, we have volumes and volumes of legislation and regulations designed to protect the environment, yet at this moment we face an unprecedented ecological crisis. This irony is as real and dramatic as the one Leopold observed when he explored the forests of White Mountain and Escudilla.

We are justifiably proud of our parks, refuges, wilderness and other preserved areas. Our system of laws strives to protect endangered species worldwide, provide for wildlife and multiple uses, clean the water, clear the air and save the soil. We have advanced both in ecological and managerial knowledge. The recovery of the peregrine falcon and bald eagle and the recent reports from condor and black-footed ferret breeding facilities bring welcome news.

These encouraging elements are only part of the picture, however. Nearly 500 U.S. plant and animal species are currently listed as threatened or endangered; over 3900 additional species have been identified as candidates for listing. Since the program began in 1973, only four species have recovered sufficiently to be removed from the list, while six have gone extinct in spite of federal protection. Many waterfowl populations are at all time low numbers; some shorebird species are declining at an alarming rate. Researchers tell us that species are vanishing from our national parks. Over 60 percent of our public rangeland is in unsatisfactory condition. Lacking adequate water supplies, wildlife refuges are drying up, concentrating poison and luring birds to their deaths. On an international level, the loss of species diversity is even more staggering as tropical forests are felled and coral reefs destroyed. These disasters -- these threats to biological diversity -- continue in spite of the Endangered Species Act, National Forest Management Act, Migratory Bird Treaty Act, conservation additions to AID and World Bank appropriations and other legislation designed to protect ecological values and provide for fish and wildlife. If Congress intends to preserve biological diversity, we must aggressively execute current laws and programs, coordinate efforts both nationally and internationally and dedicate our resource agencies to this common and very necessary goal. If not, we are likely to find ourselves, 100 years after Leopold's first trip West, with a growing record of legislation and good intention overshadowed by an irreversible crisis of global biological impoverishment.

The National Audubon Society was organized at the turn of the century to protect birds and their habitat. The Society has since expanded its scope to promote diversity, balance and beauty of all life throughout the world. We thank the Chairman and members of this Committee for recognizing the significance of biological diversity. The Society's 550,000 members strongly support H.R. 4335 and the elevation of conservation of biological diversity to

a national priority. We endorse the Committee's efforts to fund additional research, collect and disseminate information, establish a federal conservation strategy and coordinate agency efforts. The cries of alarm we hear today must be answered with resolve, innovation and enthusiasm.

If we are to reverse the trends of environmental degradation, if we are to add to our lists of successes in ecological conservation, the National Audubon Society urges Congress to take four necessary steps. First, Congress must proclaim that preservation of biological diversity is a national policy of the highest priority and incorporate this principle into existing legislation and programs. Second, existing laws and programs designed to preserve the integrity of natural systems must be adequately funded and enforced. Our third recommendation involves Cabinet level officials and agency directors who inspire, direct and motivate resource agency personnel. Through confirmation and oversight hearings, Congress must ensure dynamic leadership and support for the conservation of biological diversity. Finally, since our land management agencies also respond to public demands, Congress must encourage and support environmental conservation education programs in our school systems, universities and in other opportunities. The general public must appreciate the value of biological diversity, recognize subtle and cumulative threats to the environment, and understand the "real" price of many goods and services. Only with public understanding and support will Congress and resource managing agencies make necessary progress in conserving biological diversity.

Allow me to elaborate on a couple of these points. Existing laws and programs designed to preserve biodiversity must be adequately funded and enforced. We have heard today of the successes of many federal programs in conserving biological diversity. I do not doubt those successes, nor do I doubt the professional dedication of our researchers and managers in the field. But successes do not imperil species, communities or ecosystems -- failure and neglect do.

Forest, rangeland and aquatic habitats within the National Forest System support more than 3,000 wildlife species including 185 plant and animal species listed as threatened or endangered. In addition, over 700 species are considered sensitive and receive special management considerations. Wildlife resources attract over 33 million user-days of recreation and are valued at nearly \$650 million for hunting and fishing alone. In spite of these impressive figures, fish and wildlife programs represent a mere 2 percent of the total Forest Service 1988 budget (\$47 million of \$2.5 billion) and consistently meet only half the Resources Planning Act goals.

Fish and wildlife play minor roles in the National Forest System's management compared with commodity uses. More than 124,000 acres of habitat were "improved" in FY 1987, but most of these improvements were to mitigate impacts associated with other uses. In the past six years, the number of

acres directly improved for wildlife has declined by over 60 percent. While wildlife may benefit from funds spent in other programs, the 2 percent share is clearly inadequate to maintain the biological diversity of fish and wildlife species on the system's 191 million acres of land.

In Forest Service Regions 5 and 6 of the Pacific Northwest, the northern spotted owl has been selected as a "management indicator species" as required by the National Forest Management Act. The Forest Service must maintain viable populations of spotted owls, having sufficient numbers and distribution to ensure continued existence in the planning area. The status of the owl, and the effects of habitat loss and fragmentation are currently matters of contention. The Forest Service's spotted owl guidelines define "spotted owl habitat areas" (SOHAs) designed to support pairs of owls. One would assume that SOHAs would be established in areas of preferred owl habitat. But these owls nest in the same big tree ancient forest stands preferred by timber companies. A Washington State Department of Wildlife biologist describes the results of Forest Service SOHA selections:

Many of the network sites are not in the right place. There has been an effort to put the SOHAs where they will have the least impact on timber harvest. The result is a situation of SOHAs without owls (21 percent of the network sites do not have owls) and owls without SOHAs (47 percent of the known owls are not in SOHAs). SOHAs that are known to not have owls in them are being retained in the network while known owl sites are being logged. (H. Allen, 1988)

While nearly all owls occur in old growth or mature forests, some SOHAs have been established in recently burned areas which completely lack suitable habitat characteristics. Some areas in the Olympic National Forest had been burned in the 1950's, yet some of these sites were established as "capable SOHAs;" capable meaning the sites "could" support owls in 200 - 300 years, far beyond the planning document's time frame.

We understand the difficult role of the Forest Service in the Pacific Northwest as it attempts to balance short and long term economic needs, wildlife, fisheries, recreation and other public demands. There, are encouraging instances of good inventory efforts and reduced harvest proposals. But we are extremely alarmed at "the effort to put SOHAs where they will have the least impact on timber harvest." This does not conserve biological diversity; it promotes biological perversity. It is almost as though the Forest Service intends to select and breed a new race of spotted owl which thrives in small, fragmented patches of spindly trees...perhaps this is a new twist to biological diversity after all.

The Forest Service is mandated to provide for multiple uses, recover endangered species and ensure the survival of selected indicator species. In a recent workshop, senior agency officials admitted the inadequacy of the

current endangered species program and initiated steps to upgrade this program. We applaud and support this effort. An additional mandate to conserve biological diversity will help the Forest Service develop its endangered species program. But the effort to conserve biological diversity in the National Forest System will not be successful until the mandates of existing law are followed more closely and funded at an adequate level.

The U.S. Fish and Wildlife Service also assumes a central responsibility for maintaining and protecting fish and wildlife resources and for conserving biological diversity. Our system of wildlife refuges are essential sanctuaries and/or stopovers for many species of wildlife. The Service also provides valuable research and enforcement efforts and is considered the nation's lead agency in wildlife conservation. For all of these reasons, recent Colorado news items are particularly disturbing.

According to the Rocky Mountain News, the Fish and Wildlife Service Regional Director instructed staff biologists to enter a "no jeopardy" opinion on a proposed Colorado dam project, even before the biological studies were completed. The project could impact 10 threatened or endangered species as it floods some habitats and potentially dries others. The Fish and Wildlife Service is required to determine the impact of the project on listed species after a comprehensive scientific study and to base its decision on the best available scientific evidence. But it appears the decision was made 8 months before the required study was completed.

Audubon feels this instruction was contrary to the mandates of the Endangered Species Act and has requested a congressional investigation. The requirements of the Endangered Species Act are clear. It is supposed to be the foundation of our efforts to conserve biological diversity. Yet the Fish and Wildlife Service seems to be pursuing a policy of accommodating development at the expense of endangered species. (Copies of the news articles and National Audubon's letter to Representative Gerry Studds are attached.)

I cite these examples to emphasize the need for priority programs to conserve biological diversity and the need to ensure that existing statutes, designed to protect species and their habitats, are adequately enforced. I am sure that there are similar examples of both successes and failures in all agencies.

Regarding the specifics of H.R. 4335, again we thank the Chair and Committee for recognizing the value of biological diversity and addressing the need for a more emphatic federal conservation program. The magnitude of threats, including habitat loss and modification, toxics and other pollution, competition and the effects of global climatic change, is unprecedented.

Section 4 states a principal purpose of this Act is "to educate the citizens on the importance of biological diversity..." The value of ecological education cannot be overemphasized. Federal land management agencies solicit, and respond to public input on both immediate and long term

management proposals. The federal government must make every effort to increase public understanding of the value biological diversity. One area of potential improvement is university education. I have observed that while a few of our state institutions offer an opportunity to major in "environmental studies" or in some similar program, many universities and colleges offer minimal exposure to the relationship between human society and natural systems. When I last attended the University of Utah for instance, an environmental studies course was offered in one section, during only one term. The school educates over 20,000 undergraduates. We recommend specific language to support, encourage and lead our education system, public and commercial television, museums and other institutions in an effort to further educate the general public.

We support the proposed amendment to the National Environmental Policy Act. We do feel, however, that provisions to protect diversity should be enforceable and would like to work with the Committee to develop language to be added to this section specifying that any federal actions likely to substantially or significantly decrease species or habitat viability be considered a violation of this Act.

We strongly support the recommendation, made in testimony last fall before this Committee, that boards and committees established in the Act include representatives from the worlds of medicine, industry, agriculture, science and finance. Too often conservation programs are characterized as opposition to economic or social progress. We know this portrayal is false.

A comprehensive federal program designed to conserve biological diversity must enlist broad support. Those industries and individuals enjoying demonstrated benefits of diverse plant and animal species, as well as those most obviously affected by less diversity, can contribute to this effort.

Interagency coordination is an absolute necessity. In my home state of Utah, multiple federal agencies determine the fate of diverse natural systems. Interagency coordination should include representatives from:

- 1) Bureau of Land Management
- 2) Fish and Wildlife Service
- 3) Bureau of Reclamation
- 4) Corps of Engineers
- 5) Forest Service
- 6) National Park Service
- 7) Department of Defense
- 8) Bureau of Indian Affairs
- 9) Environmental Protection Agency
- 10) National Marine Fisheries Service
- 11) Council on Environmental Quality

In addition, for international issues, the U.S. Agency for International Development, the Department of State, and the Department of the Treasury.

Given the checkerboard land ownership pattern in public land states, representatives of state land management and at wildlife agencies should also be consulted. I realize the purpose of the Interagency Committee is to coordinate federal activities, but I hope that the state role could be addressed and included also.

Fragmented jurisdictions compromise responsibility and make coordination even more critical. Congress should encourage and facilitate consolidations of scattered agency lands where isolation is a major obstacle to ecosystem management and conserving biological diversity. In this context, Audubon has supported the concept of "Project Bold," a Utah initiative which seeks to exchange thousands of one-square mile state inholdings for consolidated federal parcels. These proposed exchanges, of course, must be subject to strict scrutiny and produce a net management and conservation benefit.

When human populations were small and technology more primitive, our ability to modify the natural system was very limited. As we assume an increasingly powerful role in the biosphere, we must modify our attitude and approach in order to preserve the ecological bases of our culture. Perhaps we should consider a sustained yield of spotted owls, desert tortoises and red cockaded woodpeckers, in addition to our stated management goals of board feet and animal unit months. Perhaps benefit-cost analysis should be made in the real currency of biological diversity and ecosystem integrity, not in the abstract and symbolic currency of dollars and cents. This Act's emphasis on conserving biological diversity should produce immediate tangible results as well as stimulate additional debate on future management.

In "The Land Ethic," Leopold told us, "a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." A comprehensive and coordinated strategy to conserve biological diversity is clearly the right thing.

The National Audubon Society strongly supports H.R. 4335. We thank the Committee for its endorsement of the essential program and would be happy to provide any additional information you may require.

National Audubon Society

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25 May 1987

Representative Gerry E. Studds, Chairman
Fisheries and Wildlife Conservation and the Environment Subcommittee
Merchant Marine and Fisheries Committee
1501 Longworth Building
Washington, D.C. 20515



Dear Representative Studds:

The purpose of this letter is to request that the Fisheries and Wildlife Conservation and the Environment Subcommittee begin a congressional investigation into the conduct of the United States Fish and Wildlife Service officials in Denver and Washington regarding the Two Forks project and the Service's responsibilities under the Endangered Species Act.

We are concerned that the Service's rendering of a no jeopardy biological opinion with mitigation measures which we consider to be inadequate for the proposed Two Forks dam may have been biased by strong political pressure and may not have been based on the best scientific information available as required by the Endangered Species Act.

Recent newspaper accounts (copies enclosed) based on internal agency documents indicate that conclusions about the biological opinion were reached months before the scientific studies were completed and those conclusions may have compromised the required environmental studies. The first article quotes one of the February 1987 documents:

"Galen (USFWS Regional Director) said no way will there be a jeopardy opinion on the Platte (River) for any of the listed (threatened and endangered) species regardless of the amount of water withdrawn by upstream projects."

This is nearly eight months before the Service released a draft biological opinion.

The second article indicates that an April 1987 memo gave edicts that "employees in the endangered-species section of the Grand Island (NE) field office were not to keep memos, reports or any other documents concerning Two Forks unless approved by the regional office, were not to meet with the Denver Water Board unless a representative from the Denver office was present, and were allowed to send only verbal, not written, reports on Two Forks to the regional office."

Once these allegations were revealed in the press, the U.S. Fish and Wildlife Service Director, Frank Dunkle, ordered an internal investigation into the matter (see 4/29/88 clipping). Based on the Service's handling of this issue to date, the internal investigation does not inspire confidence and at best looks to the public like a whitewash, at worst it looks like a hunt for dissidents and whistle-blowers in the agency. Although results of the internal investigation were to be reported to Director Dunkle on April 13th, the Fish and Wildlife Service has not yet made the findings public. Senator J. James Exon has recently requested that the Secretary of the Interior provide the results of this internal investigation and other documents pertinent to the Service's "no jeopardy" opinion.

AMERICANS COMMITTED TO CONSERVATION

For the foregoing and following reasons, we believe that only a Congressional subcommittee with the power to subpoena the necessary documents can carry out a thorough investigation of this matter.

The Platte River in Nebraska provides habitat for over 250 species of migratory birds (including several million ducks and geese), supports the largest concentration of sandhill cranes in the world, and is used by at least five federally endangered or threatened species of birds.

National Audubon has had a longstanding interest in the Platte River, has worked to protect the riverine habitat that remains, and has made the Platte one of its top five national conservation priorities. Today, when 70% of the river's flows are consumptively used, we are trying to protect the flows necessary to maintain the remaining habitat that supports the wildlife dependent upon the river. Consequently, we have been very concerned with the proposed 1.1 million acre-foot proposed Two Forks water storage project on the South Platte River near Denver. Additionally, National Audubon has been trying to protect the river's flows in almost all other proposed development plans in the Platte River Basin.

National Audubon provided extensive comments to the Fish and Wildlife Service on its June 2, 1987, draft biological opinion on Two Forks. We pointed out nearly two dozen deficiencies, emphasized our concerns about the inconsistency between the scientific information documented in the draft opinion and the conclusion of no jeopardy with inadequate conservation measures. We also stated our concerns that the Service was sharply deviating from past policies, and requested that the Service issue a jeopardy biological opinion with reasonable and prudent alternatives that would offset the effects of Two Forks. A number of other conservation organizations voiced similar concerns.

When the Service issued its Final Biological Opinion, (October 1987), we were dismayed to find that the Final Opinion offered even less protection of downstream habitats. We were concerned by reports that the agency was under a great deal of political pressure to issue no jeopardy opinions. However, we were even more concerned by the fact that the basis of the biological opinion rested on a computer hydrology model developed by the Denver Water Board, but kept secret at their insistence behind the screen of the Trade Secrets Act and the Freedom of Information Act.

Consequently, we filed a Freedom of Information Act (FOIA) request for documents regarding the Biological Opinion on December 16, 1987, (copy enclosed). Although the law allows 20 days for a response to a FOIA request, we did not receive a response until four months later. It was dated 14 April, 1988 (copy enclosed). It included a list of more than 540 documents which were withheld from us as predecisional documents. Although some documents were provided, the list of documents excluded can only be described as excessive and indicates that the Service has not attempted a good faith compliance with our request.

-3-

When the Rocky Mountain News article of 14 April disclosed that internal documents dated February 1987 showed that the Fish and Wildlife Service's regional director had ordered that there would not be a jeopardy opinion, we received a second letter from the Service (dated 18 April 1988-copy enclosed) excluding yet another document. We believe the excluded document, may well be the document obtained by the press, and is described as:

2/19/87 Telephone call record to Grand Island from Barry Mulder re:
Platte River and other Consultations.

We have reviewed all documents made available, obtained copies as appropriate to our needs and have filed an appeal of the Department of The Interior's decisions of April 14 and 18 (copy enclosed).

In our review of all of the documents provided and the lists of all documents withheld, we have not been able to find the April 1987 document referred to in the Rocky Mountain News report of 4/29/88.

Therefore, we question the Service's handling of our request, and wonder if some documents have been destroyed or kept confidential despite the Freedom of Information Act requirements. Again, we believe that the subpoena power of the your subcommittee is essential to gain a full review of the documents, the handling of the biological opinion on Two Forks, the handling of the public FOIA requests and the subsequent internal investigation.

Because of the serious threats to the resources and the national implications involved in this matter, we urge you to immediately begin a Congressional investigation. If we can provide additional information or be of assistance in any way, please contact Ed Pembleton, in our National Capital Office, (202) 547-9009.

Sincerely,



Peter A. A. Berle
President

Local

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Water board shaped feds' Two Forks report

the same conclusion without Buterbaugh's directive. But his instructions laid the process and cast doubt on the objectivity of the ruling, said several Fish and Wildlife Service biologists interviewed by the News. They declined to be identified for fear of reprisals. Environmentalists said they fear the opinion on biological factors was tailored to suit the Denver Water Board.

"The decisions were political," said Carle Puchner, the National Audubon Society's Platte River coordinator. "The Fish and Wildlife Service is supposed to make its decision on the best scientific information available. In this case, they didn't base their decision on biology, and in that sense, it's a violation of the (federal endangered species) act."

The giant Two Forks dam is proposed by the Denver Water Board and 43 suburban water providers near the confluence of the South Platte River and its north fork in western Douglas and Jefferson counties.

Environmentalists claim it will flood a third of the only known habitat for the Pawnee montane skipper butterfly near Deckers and reduce flows in the Platte River habitat of the endangered whooping crane, piping plover and interior least tern waterfowl.

The Army Corps of Engineers, responsible for issuing a permit to build the dam, acted in its environmental study that even after mitigation efforts, up to 33% of the butterfly's habitat would be gone, and some least terns and piping plovers would die during dry years when the Platte's flows diminish.

See TWO FORKS, page 13

By JANET DAY
Rocky Mountain News Environmental Writer
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Federal wildlife officials decided the proposed Two Forks dam southeast of Denver would not jeopardize endangered species months before scientific studies on the project were completed, the Rocky Mountain News has learned.

In February 1987, internal documents show, Galeo Buterbaugh, regional director of the U.S. Fish and Wildlife Service in Denver, told staffers they were not to consider a "jeopardy" opinion. Scientific studies that were to have led to a decision were under way. A "jeopardy" opinion would have meant the project threatened the existence of one or more endangered species on the South Platte and Platte Rivers. Such an opinion could delay or stop the dam.

"Galeo said no way will there be a jeopardy opinion on the Platte (River) for any of the listed (threatened and endangered) species regardless of the amount of water withdrawn by upstream projects," according to the documents.

In June, a draft "biological opinion" was released stating the project did not jeopardize threatened or endangered species if Denver agreed to several conservation measures, including replacing lost habitat. A final opinion, virtually unchanged from the draft, was released in October.

The Fish and Wildlife Service might have come to



Animals that could be hurt by Two Forks dam

Bald eagle	Rainbow sucker
Peregrine falcon	Greenback cutthroat trout
Whooping crane	Pawnee montane skipper
Bonytail chub	Western yellow-billed cuckoo
Humpback chub	River otter
Colorado squawfish	Great blue heron
Interior least tern	Central johnny darter
Piping plover	Common shiner

ROCKY MOUNTAIN NEWS

Turn, led

TWO FORKS / from page 6

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Cowp officials yesterday told the News they weren't sure what they'd do if the opinion on biological factors was faulty.

Early in the study process, the final biological opinion for the Platte River indicated, Denver water officials "expressed the desire to avoid jeopardy is listed species." Denver offered to offset threats to endangered species by clearing land for habitat, monitoring species numbers and taking other conservation measures.

"I wouldn't call it political pressure, but they certainly challenged our findings," Betschlag said. "There are many ways to go about this. In this case, Denver had the

money to hire their own consultants and then challenge everything we came up with (about protecting Two Forks and jeopardy to endangered species).

Denver had the money to hire their own consultants and then challenge everything we came up with. It's perfectly legal, but it makes it more difficult.

Gordon Betschlag, U.S. Fish and Wildlife Service

tential threats to endangered species. It's perfectly legal, but it makes it more difficult.

"There we were pushing for a se-

parate opinion. That's obviously the last way for us to proceed with the project and we believed it was an appropriate call," said Steve West, Denver's top Two Forks official. But he denied the water board carried undue influence.

The Fish and Wildlife Service biological opinion are critical to the Corps of Engineers and the U.S. Forest Service, the two agencies that will decide whether the dam can be built and if so, what must be done to offset environmental damage. In the 1970s, the Tullahoma Dam in Tennessee was delayed several years when studies found it threatened the only known home of the small darter fish.

14, April 29, 1988, Denver, Colo. Rocky Mountain News-7

U.S. agency probes Two Forks decisions

By JANET DAY
Rocky Mountain News Environmental Writer

The U.S. Fish and Wildlife Service is investigating reports that its Denver regional director based decisions about the proposed Two Forks dam on politics rather than science. The investigation stems from a Rocky Mountain News report this month that regional director Gale Buchanan had ordered biologists in the Grand Island National Wildlife Refuge to give the project a "no jeopardy" opinion even though biological studies were completed. Buchanan reportedly was pressured by the Denver Water Board, which wants to build the dam southwest of Denver.

Such an opinion indicates that a project would not jeopardize the existence of endangered species. The opinion is critical to an Army Corps of Engineers' decision on whether the dam can be built.

The investigation is being headed by Mary Duncan, special assistant to the director at the agency's field service center in Lakewood, and Robert Smith of the endangered species section in Washington, D.C. Smith had worked on the Two

Forks endangered species studies at the Grand Junction field office several years ago.

The investigation, ordered Tuesday by director Frank Double, "has a narrow scope," Duncan said. "It's to try to find out if the information (in the News article) is in fact factual and whether such a statement was made by (Buchanan)."

Employees of the Grand Island office will be brought to Denver for questioning next week, Duncan said. Employees of the local endangered-species division also will be questioned. Duncan and Smith are to report to Dunkle by May 13. Several conservation groups and Sen. J.J. Exon, D-Neb., have called for investigations into reports that the biological opinion was politically motivated rather than scientifically based.

In late 1986, the Fish and Wildlife Service regional office in Denver took over the studies from the Nebraska field office, stripping biologists of their powers to recommend protections for endangered species, which include whooping cranes, other birds, fish and a butterfly.

According to an April 1987 memo recently obtained by the News, employees in the endangered-species section of the Grand Island field office were not to keep memos, reports or

any other documents concerning Two Forks unless approved by the regional office, were not to meet with the Denver Water Board unless a representative from the Denver office was present, and were allowed to send only verbal, not written, reports on Two Forks to the regional office.

The field office was not given a copy of Denver's proposed mitigation plan but was instead told to travel to Denver to review the document. The memo was initiated by field office employees under the words, "We will respect these edicts to an absolute degree."

The federal Endangered Species Act allows for "consultations" or negotiations of mitigation measures. But many environmental groups and some employees of the service said they feel the regional office went too far, in effect letting the Denver Water Board write the opinion.

"Something is fundamentally wrong with the system when you have ... the Denver Water Board consultants assisting in drafting a no-jeopardy opinion," said Jay Hale, president of the National Wildlife Federation, who threatened to sue the service for violating the Endangered Species Act.

"If that's the case, in the world wouldn't they ask the environmentalists to write a counter opinion."

Sunday, June 5, 1966

Rocky Mountain News

Page 6

Wildlife action on Two Forks scrutinized

By JAMES DAVY

Rocky Mountain News Environment Writer

Allegations of political bias swirling around the Two Forks dam project have prompted the federal Fish and Wildlife Service to launch a broad, heated challenge to the federal Endangered Species Act under the Reagan administration.

Reports in the Rocky Mountain News have prompted congressional inquiries into whether the U.S. Fish and Wildlife Service really is as objective and unbiased as it claims to be in its actions under the Endangered Species Act. The federal agency has been accused of several environmental protection subcommittee, the House Conservation Committee, and the Senate Environment and Public Works Committee. The agency is also being questioned by the House and Senate subcommittees on whether it is an adequate indicator of the Two Forks controversy is an attempt to indicate the Fish and Wildlife Service's nationwide reliance



Frank Dunbar

on politics and money rather than scientific analysis to protect endangered species.

Environmentalists and several members of Congress charge that the Fish and Wildlife Service, under the direction of Frank Dunbar for the past two years, has slanted its actions at the 15-year-old law and altered developers to buy their way around it by agreeing to improve mitigation measures.

Before taking over the agency's helm in 1964, Dunbar oversaw endangered species programs in the Department of the Interior. Earlier, he headed the Montana Fish and Game Department. Dunbar also is an environmental advisor to Vice President George Bush's presidential campaign.

Political pressure "certainly has shown up a lot, whether in the form of pressure on the agency or from part of the public," Dunbar said. "I don't think it's fair to say that the National Wildlife Federation is the only group that has been influential. The administration probably will call that program to make the act more workable."

Several Fish and Wildlife documents concerning Two Forks and submitted by the News indicate that pressure from the Denver Water Board led to the "no jeopardy" decision

for waterfowl, including the endangered whooping crane, that use the Platte River in Nebraska and Two Forks in Colorado.

A "no jeopardy" decision would mean the project could push some species into extinction. Such a decision could put a delay a project. No-jeopardy opinions are required for mitigation efforts designed to offset environmental damage.

Allegations of executive political and industrial pressure recently have been raised concerning other projects. They include:

• The Gary Dam in west Texas near the confluence of the Colorado River and the Concho River. It is expected to be completed in 1970. The dam is the only known habitat of the Concho water snake. But of late, the dam has been the subject of a congressional delegation, the Fish and Wildlife Service issued a no-jeopardy opinion and agreed to experimental protection methods.

• Timber operations in the Northwest. Pressure from timber interests led the Fish and Wildlife Service to get out the wolves spotted owl as endangered, critics claim.

See 040013, page 30

DUNKLE/From page 6

The owl nests in old-growth forests that are prime logging locations in Nevada. Fish and Wildlife Service biologists are studying the land tracts that would allow construction of a rocket plant on 10,000 acres that would threaten endangered fish species and the desert tortoise, environmentalists claim.

The Endangered Species Act was passed in 1973 to identify and protect animals and plants species on the brink of extinction. The purpose of the act is to prevent the overexploitation and commercialization of the act in the future. However, it is stated in the Senate where debate over the desert tortoise and possible project exemptions have given confusion.

"Historically, the presumption was on jeopardy species, and that's what the act was intended to do," said Robert SanGeorge, director of the National Audubon Society. "The administration is trying to turn that on its head."

Fish and Wildlife officials concede the agency's approach to endangered species has changed, but call that change realistic and workable.

Dunkle has been unavailable for comment since he left the agency. Robert SanGeorge, director of the Fish and Wildlife Service in Denver, says the change was effected to simplify the process.

"The easier way is to sign an agreement that they'll institute conservation measures and give them a no-jeopardy opinion," he said. "The end result is the same as if you went through the usual process. The project backers refuse to undertake the measures, it automatically becomes a jeopardy opinion and an adversarial approach."

Dunkle, speaking in Lincoln, Neb. in 1981, said endangered species would not stop water projects.

"We can and we will approach the Endangered Species Act to protect species and not slow down other uses of the water," Dunkle said. "We can help them (endangered species) without slowing the world."

At the time, Dunkle was working in the Denver regional office where he was involved in early Two Forks discussions and

6 We can help (endangered species) without stopping the world.

Frank Dunkle,
Fish and Wildlife official

attended meetings with the water board about the project.

Since arriving in Washington, he has been harshly criticized for his handling of endangered species programs such as reintroducing the timber wolf to northern states and dealing with grizzly bear problems.

Biologists in the agency say the change has weakened the law and restricted their work.

"The philosophy of consultation (negotiating endangered species agreements) is changing under Dunkle," said a Fish and Wildlife employee who used to work on the

Two Forks project. The employee asked not to be identified for fear of further reprisal. Several employees, including that one, say they were transferred because of the Two Forks controversy.

"The lack under Dunkle is to issue a no-jeopardy opinion since the (project backers) already have agreed on mitigation measures," the employee said.

Dunkle played a key role in the Story Dam biological opinion, environmentalists claim. Lloyd Boulton in the summer of 1980, things started to change," said Brant Manning, wildlife chairman for the Sierra Club. "I don't know if he was saying the project can't get it, then they have to do something about the make. Then that changed to where they were making him of excuses on why the make could survive with most of its habitat lost."

In the case of the spotted owl, the Sierra Club and other conservation groups have pushed and the Fish and Wildlife Service over its failure to designate the owl as endangered. The case is pending in federal court in Washington state.

The Aeryjet project originally resulted in a jeopardy opinion from local biologists, but the Portland, Ore., office changed it to no-jeopardy without releasing any of the biological information, according to employees of the House subcommittee on fisheries and wildlife.

With Two Forks, the Denver Water Board and Metropolitan Water Providers wrote their own mitigation plan and documents show that attorneys for the water board

actually wrote sections of the biological opinion. Changes made between drafts include replacing the words "would" and "will" with "may," thereby lessening the force of statements about the dam's effects on species, particularly the expected deaths of terns and plovers.

Boulderburgh points to the vast financial resources of the Denver Water Board as one factor that led to the no-jeopardy opinion.

6 The administration is trying to turn that (presumption) on its head.

Robert SanGeorge,
Audubon Society

"The water board had more money to hire more experts and made us work harder to defend our position. We're not used to being under that level of scrutiny."

Congressional investigators, however, said that's a specious argument.

"The job of service biologists is to use the best available information to provide the most accurate opinion, regardless of pressure or challenges," said Ron May of the House subcommittee on fisheries and wildlife.

Mr. BROWN. Thank you, Mr. Pissot. Dr. Plotkin, we are going to go take a brief recess and then come back and watch your slides and listen to your testimony, if you will excuse us at this time. We will be in recess for 10 minutes.

[Recess.]

Mr. BROWN [presiding]. The subcommittee will come to order. We apologize for the disruption. That will be the last one of the day.

Dr. Plotkin, you may proceed and, hopefully, somebody will turn off the lights so we can see the slides.

Mr. PLOTKIN. OK. I'd like to begin by thanking you for giving me the opportunity to be here representing the World Wildlife Fund, the world's largest international conservation organization.

What I'd like to do in my 5 minutes is take a little step back and look at this in an international context, how the biodiversity tree fits in the international scene and vice versa.

I'd like to also begin by congratulating my colleague, Dr. Blockstein, for getting all the conservation organizations to pull together on this. I think that's a much greater feat than trying to get Jim and Tammy Bakker to get along with Jimmy Swaggert at this point.

So, what I want to do is focus on a few agricultural examples to talk about the importance of biodiversity around the world and its role in U.S. markets and economic well-being.

As we all know, forests around the world are being destroyed. Beautiful scenes like this in the Atlantic coastal forest of eastern Brazil now look like this. This particular forest formation has already been reduced to 98 percent of its original cover.

This is happening around the world, and it's taking a terrible toll on plants and animals, both here in the United States and in other countries, as well.

Now, few of us realize how many of the agricultural products we depend upon originated outside of our borders. This picture of corn in its native habitat was obviously not taken in Battle Creek, MI. Corn originated in the highlands of Central America.

Rice originated in tropical Asia. Bananas originated in Asia, as well, as did black pepper. Virtually all citrus fruit, cinnamon, and sugar cane originated in tropical Asia.

Pineapples originated, not in Hawaii, but in the Amazon. Cashews originated in the Amazon, as did papayas—not in sunny southern California, I might point out. Tomatoes originated in the Amazon.

Vanilla is actually an orchid native to tropical Mexico. Chili peppers originated in tropical America. Potatoes originated in the Andes. Chocolate comes to us, not from Switzerland, but from the Amazon.

Now, we tend to take these plants for granted. The fact is that 98 percent of U.S. agriculture is based on plants which originated outside of our borders. It's important to protect our own biological resources, but our well-being is tied to resources, particularly plant resources, around the world.

If you look at a typical American breakfast of Rice Krispies, cornflakes, sugar, orange juice, grapefruit juice, hashbrown potatoes, hot chocolate, tea, coffee, and pineapple, virtually all of those originated in tropical forests.

Just because we pulled some of these things out of the forest, like corn that will grow well in our country, and they are a major source of income to the American farmers does not mean we can allow biological diversity to disappear outside of our borders.

We should stay away from the idea of Fortress America and that just protecting diversity within our borders solves the problem. Just in the case of songbirds alone, a major proportion winter outside our country. So, even if we protect everything in our country, what happens in other countries concerns us, as well.

Just to show you how we take these plants for granted, in case anyone here doubts the importance of these plants in our own political history, Martin Luther King's ancestors were brought to this country with the rise of the sugar cane economy in the south. JFK's ancestors were brought to this country at the time of economic turmoil in Ireland caused by the genetic bottleneck with the Irish potato, so-called, that originated in the Andes.

In fact, the history of western civilization has been driven by the search for new tropical plant products to benefit mankind. Everyone from Columbus to Marco Polo traveled to the tropics to find new and useful plants to benefit the people in the temperate zones.

Again, to show you how we take these things for granted, before Columbus discovered America the French had no vanilla, since vanilla is native to tropical Mexico. Before Columbus discovered America the Swiss had no chocolate. Before Columbus discovered America the Irish had no potatoes. Before Columbus discovered America the Italians had no tomato sauce.

Now my friends at the World Wildlife Fund refer to this as the Carmen Miranda approach to conservation. But I think this is an effective way to talk about the global importance of biodiversity around the world.

Furthermore, new plant products are showing up in our supermarkets and showing up in our agricultural systems. This is starfruit from the eastern rain forest of Brazil. Every time you go into a major supermarket there are new plants that nobody knew or heard of before that are appearing and showing up as staples.

In fact, demographic trends indicate that our dependence on these plants will grow. The U.S. population increased about 27 percent in the last 20 years, but the increase in the Hispanic population has been 87 percent, and the Asian population has been 127 percent. So, our dependence on this foreign germ plasm is important for restaurants in this country and is important for agriculture in this country, as we reduce our overdependence on just a few species, as is the case today.

These new plants are important in terms of genetic enhancement. Our crop species must continuously be improved by wild relatives or semi-domesticated relatives around the world.

For example, potatoes, a mainstay of American agriculture: two new species from the Andes are found to have sticky hairs which attract and then trap insects. Crossbreeding of these new species of potatoes with our own domestic species could conceivably reduce our dependence on pesticides. In this photoelectron micrograph you see the killer potato in action.

Industrial products are also important from plants. In fact, 20 percent of our petroleum in this country goes for non-fuel purposes.

That is, to make plastics, adhesives, paint thinners, and things like that. Most of these substances can now be synthesized from plants. These so-called botanochemicals are destined to become increasingly important in the future.

Now, I'm just a biologist. I'm not a policy analyst. But I would rather rely on the renewable resources of the Amazon than the non-renewable resources of the Persian Gulf at this point in time.

Plants are also important as sources of biodegradable pesticides. Here you see an Indian in the northeast Amazon hunting, or bow fishing, actually, after having thrown in a plant, which he then showed me after the fishing expedition was over.

It turns out that this plant is now the source of a major biodegradable pesticide. That is, rotenone. There are many plants known and used by these peoples as poisons which could have important applications in medicine, industry, and agriculture in our own country.

Finally, I just want to show you what's happening. I hasten to point out that each and every plant that we use in this country that originated outside of our borders, at least that originated in the tropics, was learned of from native peoples. However, we're facing a crisis in terms of cultural diversity, as well as genetic diversity.

Let me show you what happened with just this one Indian, who was the one who taught me about this fish poison plant. Here you see the fellow in 1982. Two years later in 1984. Two years later in 1986.

Now, the advent of western technology and western so-called civilization in these countries is taking a terrible toll on both the native peoples and on the genetic diversity. It's my belief that we pay a real price when native knowledge of which plants are useful is lost, and when the plants and animals are lost, as well.

So, what we are trying to do, as part of our effort to protect biological diversity around the world, is move into these forests to work with native peoples to document new and useful products for American agriculture, American industry, and American medicine. By doing this, we hope to generate the means to sustainably utilize tropical ecosystems to protect these plants and animals for future generations.

Now, let me conclude on the subject of the biodiversity bill. I would like to look at it from two angles.

From the domestic angle, I think that it is very important that we state strongly and clearly that biodiversity is at the top of our national agenda. However, I would not like to see this done to the detriment of support, both vocal and financial, for conservation activities around the world.

On the other hand, looking at it outside the United States, the United States has long been a leader in international conservation efforts, and many of our colleagues in other countries look to us for leadership. If the United States clearly establishes preservation of biological diversity as an important goal nationally and internationally, it will have very important and very beneficial repercussions in the future.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Plotkin, follows:]

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BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

HOUSE COMMITTEE ON SCIENCE, SPACE,
AND TECHNOLOGY

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Mr Chairman,

I am Mark J. Plotkin, Director for Plant Conservation of World Wildlife Fund. I here on behalf of World Wildlife Fund to speak about the international significance of biological diversity and the United States' role in preserving that diversity.

With 475,000 members, Wildlife Fund (WWF-US) is the leading private organization working internationally to protect endangered wildlife and wildlands. WWF-US is the United States affiliate of the WWF family, which includes 22 other national organizations with an international office in Gland, Switzerland. Together, the WWF family has more than 2 million members worldwide and a budget exceeding \$70 million. World Wildlife Fund is a field-oriented organization, supporting individuals and institutions who carry out practical conservation projects on the ground. Our top priority is conservation of tropical forests in Latin America, Asia, and Africa, places that are home to most of the world's animal and plant species. Over our 27 years, we have worked in more than 100 countries to sponsor or carry out over 1,300 projects involving a comprehensive array of conservation methods.

I would like to start by thanking you and your staff for scheduling this hearing. I would also like to say that we at World Wildlife Fund greatly appreciate both your committee's interest in biological diversity and your actions to emphasize its importance as an issue of national significance. We hope

that through hearings such as these more distinguished members of Congress will become aware of the importance of biological diversity and of the threat that loss of the world's biological resources poses to human well-being.

The issue before your committee today is one of critical importance -- what role can the government of the United States, and Congress specifically, play in protecting biological diversity? This question must be answered at two levels, one domestic and the other international. I would like to leave discussion of the domestic aspects to my fellow panelists and focus on World Wildlife Fund's area of expertise: preserving biological diversity in the world's developing nations.

The Importance of Biological Diversity

The American public is showing increased awareness in the importance of conservation of biological diversity. People are beginning to realize that conservation is not solely concerned with protecting attractive animals like the bald eagle or the African elephant. Conservation involves protecting life on earth.

Several different arguments have been put forward as to why species should be protected: aesthetic, ethical, ecosystem diversity and stability, scientific value and utilitarian. In my opinion, it is the utilitarian argument which is most effective when dealing with the governments of the developing countries which contain most of the world's biodiversity. Consequently I

would like to focus on tropical plant species which offer underexploited agricultural and industrial potential for the future as a means of showing how biodiversity can be of benefit to human welfare.

Many of the initial international wildlife conservation efforts focused on attractive species of endangered mammals- the so-called "charismatic mega-fauna." While a number of these programs have proven extremely successful, the modus operandi was clearly not entirely applicable to the conservation of all organisms- "Save the Sedges!" is just not so stirring a battlecry as "Save the Tiger!" We cannot save the pandas, however, unless we save the bamboos on which they feed. Furthermore, human existence is much more dependent on the Plant Kingdom than on animals. Plants are indeed the "Roots of Life".

Because of the sheer diversity of plant life- especially in the tropics-many conservationists in the recent past have had some difficulty trying to decide where to begin. Faced with an area like the Amazon, home to tens of thousands of species of plants, many of which have yet to be "discovered" by modern scientists, it is clearly impractical to evaluate the conservation status and potential utility of each species on an individual basis. Consequently, there has been a perceptible shift in emphasis towards plants which are either useful or potentially useful to people. The concept of protecting a plant because it shows promise for aiding human well-being seems to have a much wider appeal than preserving a species for purely

aesthetic or academic purposes.

Conservationists generally divide useful plants into three categories: medicinal, agricultural, and industrial. Of these three groupings, medicinal plants tend to attract the most attention from the media. There is no denying the appeal of the modern ethnobotanist's venturing into the jungle to work with witch doctors to find healing herbs. Due to a variety of factors- factors which are expected to change in the near future- there has been relatively little development of new wonder drugs from tropical plants during the last decade (Tyler, 1986). The recent history and predicted future for new agriculture and industrial plant products from the tropics have been very positive (Schultes, 1979; Balick, 1985).

Agriculture

Tropical forest plants can be of use to modern agriculture in three different ways:

- 1) as sources of new crops which can be brought into cultivation
- 2) as material for genetic enhancement of cultivated species; and
- 3) as sources of new biodegradable pesticides.

New Crops

Only a very small proportion of the world's plants have ever been utilized as a food source on a large scale. Of the several thousand species known to be edible, only about 150 have ever become important enough to enter into world commerce (R.E. Schultes, pers. comm.). With the movement towards a global economy, the trend has been to concentrate on fewer and fewer

species. Today, less than twenty plant species produce most of the world's food (Vietmeyer, 1986b). Furthermore, the four major carbohydrate crop species- wheat, corn, rice, and potatoes- feed more people than the next 26 most important crops combined (Witt, 1985).

The obvious place to turn for new crops to reduce our heavy reliance on such a relatively small number of species is the tropics. North America north of Mexico has contributed relatively little to man's storehouse of economic plants. If we had to live on plants which originated in the U.S., our diet would consist of pecans, sunflower seeds, cranberries, blueberries, grapes, wild rice, pumpkins, squashes and jerusalem artichokes. It has been estimated that 98% of U.S. crop production is based on species which originated outside of our borders (Caufield, 1982). Of our common foodstuffs, corn, rice, potatoes, sweet potatoes, sugarcane, citrus fruit, bananas, tomatoes, coconuts, peanuts, red pepper, black pepper, nutmeg, mace, pineapples, chocolate, coffee and vanilla are all species which originated in tropical countries. It is worth pointing out that a typical American breakfast of corn-flakes, bananas, sugar, coffee, orange juice, hot chocolate and hashbrown potatoes is based entirely on tropical plant products.

Few people realize how much of our diet today has been determined by exploitation patterns developed during the period when tropical countries were colonies of Europe. In many cases, the advantage that some current crop staples have over other, less-exploited tropical species is the disproportionate amount of

research to which they have been subjected. Under the colonial system, only a few key species were chosen for export, and the establishment of a market for these species determined future cultivation and research priorities which excluded lesser-known species. This over-reliance on a few species was maintained even after independence, since developing countries had to depend on pre-existing markets and technicians trained in temperate countries (National Academy of Sciences, 1975).

Many currently under-exploited tropical species will become common sights in the produce sections of our supermarkets during the next decade. Because the under-exploited species are often best known to aboriginal or peasant peoples, they have often been stigmatized as "slave foods" in their country of origin. This has impeded the development of these crops, which often tend to be robust, productive, self-reliant, free of indigestible compounds with relatively high nutritive value and suitable for growing in some sort of agricultural system.

The demand for tropical cuisine continues to grow in this country. The Los Angeles area is said to have over 200 Thai restaurants and Mexican fast food outlets have become a \$1.6 billion industry (Vietmeyer, 1986a). Even a short walk down M Street in Washington, D.C. reveals Chinese, Vietnamese, Thai, Filipino, Mexican, Central American and South American restaurants. Kiwi fruit from China was not introduced into this country until 1962 yet last year they were purchased by over 10 million Americans. Furthermore, domestic demographic trends will add to the demand for tropical produce. The U.S. population has

increased 17% since 1970, yet the Hispanic population has risen 87% and the Asian population 127% (Vietmeyer, 1986a).

Several of the more promising species include:

1) Pourouma cecropiaefolia MORACEAE

The uvilla is a medium-sized tree native to the western Amazon. Both harvested from the wild and cultivated by local Indians as a door step crop, it yields fruit in only three years time. The tasty fruits can be eaten raw or made into a wine (Prance, 1982; Balick, 1985).

2) Solanum quitoense SOLANACEAE

The lulo or naranjilla is one of the most highly prized fruits in Colombia and Ecuador. It is a sub-shrubby perennial with pubescent, yellow-orange fruits. The greenish flesh is made into an exceptionally delicious drink. The lulo has already been introduced in Panama, Costa Rica, and Guatemala and is being marketed as a frozen concentrate (Heiser, 1985).

3) Bactris gasipaes PALMAE

Native to the northwest Amazon, the pupunha or peach palm is a 20 m caespitose palm widely cultivated in both South and Central America. This palm can yield up to 13 bunches of fruit annually, and these fruits contain carbohydrates, protein, oil, minerals and vitamins in nearly perfect

proportions for the human diet. In cultivation, the tree will produce more carbohydrate and protein per hectare than corn (National Academy of Sciences, 1975, Balick, 1985; Vietmeyer, 1986b).

4) Amaranthus spp. AMARANTHACEAE

The three major species of amaranths (Amaranthus caudatus, A. cruentus, and A. hypochondriachus) are rapidly growing cereal-like plants that have been cultivated in Central and South America since Pre-Columbian times. The ancient Aztecs considered amaranth a sacred plant and consumed cakes made of ground amaranth seeds and human blood. Because of this religious practice, the Spanish severely suppressed the cultivation of amaranth. Nevertheless, amaranth seeds have extremely high levels of total protein and of the nutritionally essential amino acid lysine. It should be noted that lysine is usually lacking in plant protein (National Research Council, 1984; Vietmeyer, 1986b). Amaranth is currently being marketed in this country as breakfast cereal and is now being sold in many health food stores.

5) Annona muricata ANNONACEAE

The guanabana or soursop is a medium-sized tree native to tropical America. The tree produces fruit throughout the year and the delicious white flesh has a unique smell and texture which can be best described as a sort of fibrous pineapple custard. Already popular in China, Australia,

Africa and the Philippines, guanabana can be eaten raw or made into a delicious drink or yogurt (National Academy of Sciences, 1975).

6) Mauritia flexuosa PALMAE

A veritable "Tree of Life" to many Amazonian Indians, the buriti palm produces a fruit said to be as rich in Vitamin C as citrus. The pulp oil is thought to contain as much vitamin A as carrots and spinach. A starch extracted from the pith is used to make bread. An edible palm heart can be extracted from the shoots. The Indians also make wine from the fruit, the sap and the inflorescences (National Academy of Sciences, 1975). A strong fiber is obtained from the young leaves and a useful cork-like material is extracted from the petioles. The wood of the trunk is employed in light construction. Furthermore, the buriti thrives in Amazonian swamps of little use for intensive agriculture (Schultes, 1979).

Genetic enhancement of Crop Species

Relatives of commercial species must continuously be crossbred with these species to improve crop yield, nutritional quality, durability, responsiveness to different soils and climates and resistance to pests and diseases (IUCN, 1980). As mentioned above, many of the world's most important crop species originated

in the tropics. Consequently, we must look to these equatorial regions for wild or semi-domesticated relatives of commercial species to maintain or improve our crops.

A barley plant from Ethiopia has already provided a gene which protects a \$160 million barley crop in California from the lethal yellow dwarf virus. A wild relative discovered by Iltis in the Peruvian Andes has increased the sugar content of the domestic tomato industry with an increased commercial value estimated at \$5 million per year (Witt, 1985). In fact, tomatoes are one of the world's most important crops, yet they could not be grown commercially in the U.S. without genes provided by wild relatives by genetic "topping-up" (Harlan, 1984). Rice grown in Asia is protected from the four main rice diseases by genes provided by a single wild species from India (Prescott-Allen, 1983). In both Africa and India, yields of cassava-one of the most important crops throughout the tropics- have been increased up to 18 times by disease resistance provided by genes from wild Brazilian cassava (Prescott-Allen, 1983). Disease resistance provided by wild Asian species of sugarcane have saved the sugarcane industry in the southeastern U.S. from total collapse (Prescott-Allen, 1983). Perennial corn, discovered by Guzman in Mexico in 1977, has proven to be immune or resistant to the seven major diseases of domesticated corn (Witt, 1985).

Although the use of wild and semi-domesticated relatives is already extensive, it will undoubtedly increase in the near future due both to wider availability of these plants and more documentation about their potential utility (Prescott-Allen,

1983; Frankel, 1983). Rapid advances in genetic engineering will also provide greater access to the "tertiary" gene pools which can now only be taken advantage of with special techniques (Frankel, 1983).

Several species which serve as good examples of the types of plants which may prove useful for breeding purposes in our future include:

1) Coffea spp. RUBIACEAE

Coffee is a mainstay of the economy of several tropical countries, yet it is rather susceptible to certain fungal diseases. Although Africa is home to most commercial species (particularly C. arabica from Ethiopia), the island of Madagascar has approximately 50 wild species of Coffea. Some of these species may prove important for commercial breeding not only for their potential resistance to fungal infections but also because they produce beans with little or no caffeine (Guillaumet, 1984; Plotkin et al, 1985).

2) Solanum spp. SOLANACEAE

Two wild species of potatoes have leaves that produce a sticky substance that traps predatory insects which subsequently die of starvation. This type of self-defense could conceivably reduce or negate the need for using pesticides with cultivated potatoes (Gibson, 1979; Harlan, 1984).

3) Persea theobromifolia LAURACEAE(=Caryodaphnopsis theobromifolia)

Formerly one of the most important timber trees of western coastal Ecuador, this species has been pushed to the very brink of extinction due to over-exploitation. When it was finally described in 1979, it was found to be a relative of the common avocado (Persea americana) and might one day prove useful as rot-resistant root graft stock for the cultivated species (Gentry and Wettach, 1986).

Natural pesticides

Many tropical plants have evolved chemical defenses to deter predation by herbivores. Tropical people possess a sophisticated knowledge of these plants, often employing them as medicines or poisons. The calabar bean (Physostigma venenosum) was traditionally employed as an ordeal poison in West Africa, and studies of the active principals of this species led to the development of methyl carbamate insecticides. World trade in pyrethrum daisy flowers (Chrysanthemum cinerariaefolium), source of the insecticidal pyrethrum extracts, is a multi-million dollar business (Oldfield, 1984). This plant was first "discovered" because of its use by African tribal peoples to control insect pests.

South American Indians employ Lonchocarpus, a forest vine, as a poison to stun fish. Today we import the roots of this plant as a source of rotenone, a biodegradeable pesticide. Other

plants used by tribal people as fish poisons have yet to be evaluated for their potential pesticide value. Plants used to make arrow poisons or curares also bear looking into since one such species, Chondrodendron tomentosum, already provides us with d-tubocurarine, used as an anesthetic in abdominal surgery. Not only do we need to investigate the individual components employed in the manufacture of the many different types of curare, but we must study the interaction of different species which are sometimes used together. In the northeast Amazon, the preparation of an arrow poison may involve the mixing of seven different species- and the Indians insist that each plant changes and amplifies the toxicity of the poison.

Yet another category of potentially useful natural pesticides are allelochemicals. These are chemicals produced by plants which inhibit the growth of other plants and of soil microorganisms. Allelochemicals include a number of different types of chemicals and may one day be used directly or serve as models for semi-natural or wholly synthetic compounds (Balandrin et al, 1985).

Species which might prove useful as sources as biodegradable pesticides in the future include:

1) Caryocar spp. CARYOCARACEAE

One Amazonian species of Caryocar produces a compound which seems to be toxic to the dreaded leaf cutter ant (Atta spp.). This insect is the scourge of South American agriculture causing millions of dollars of damage each year.

2) Paullinia cupana SAPINDACEAE

This woody vine is native to central Brazil. Widely known as guarana, it is grown in plantations near Manaus for use in Brazilian soft drinks. Guarana contains three times as much caffeine as coffee and recent tests at Harvard have shown that caffeine and some synthetic analogues can kill or inhibit the growth of mosquitoes and other insects (J. Nathanson, pers. comm.). Should further testing reveal that caffeine will be an effective insecticide in the future, guarana could turn into a major crop throughout the tropics.

Industry

During the Arab oil embargo of 1973, the American business community was faced not only with the loss of a major energy source, but also the loss of its most important raw material for the manufacturer of innumerable synthetic products. Few realize how many of our everyday products are made from petroleum and petroleum by-products, such as plastics, fertilizers, lubricants and adhesives to name only a few. It has recently been estimated that almost one-fifth of the petroleum used in this country is employed for industrial non-fuel purposes (White, 1979). Between 1973 and 1976, annual use of petroleum-based chemicals in the U.S. was over 100 billion pounds (Princen, 1977), yet the majority of these substances can now be synthesized from plant

products (Wang and Huffman, 1981). These "botanochemicals" are destined to become increasingly important as raw materials for industry.

Up until 1985, the reasons for reducing our dependence on fossil fuels was obvious. At the present time, the price of oil has decreased sharply and there are those who feel that the heyday of the OPEC cartel is over. Nonetheless, experts disagree sharply over predictions of the future price trends for petroleum. Since oil is a non-renewable resource, and since the largest reserves lie in one of the most politically unstable regions in the world, we should try to reduce our dependence on petroleum whenever it is economically feasible.

Fats and Oils

Approximately 3 million tons of vegetable fats and oils are employed each year in the manufacture of coatings, lubricants plasticizers and many other products (Prescott-Allen, 1982). In the past, industrial usage of these vegetable products has suffered from competition with cheap petroleum synthetics (Wang and Huffman, 1981), but this is expected to change due to the uncertainty over the future of the petroleum market. Between 1973 and 1981, the price of petrochemicals increased over 700%, whereas that of vegetable oils rose less than 100% (Earthscan, 1982a). Even in the industrialized world, commercial demand for

oils for both edible and industrial purposes continues to grow and demand often exceeds supply (Schultes, 1979).

One of the most serious shortages in human nutrition, especially in underdeveloped tropical regions, is that of an adequate supply of edible oils. Several tropical forest species have been utilized by tribal peoples as sources of edible oils for thousands of years. These oils contain vitamins and minerals and are necessary for cooking in areas where butter or lard are either unavailable or in short supply. Furthermore, it should be noted that there has been little attempt at domesticating some of these species although ambitious efforts are underway in Brazil, Colombia and Malaysia (M. Balick, pers. comm.). Domestication would increase yield, lower production costs, and reduce or eliminate characters which might inhibit harvesting on commercial scale while providing a steady supply of edible and or industrial oils. Since some of these plants (like bacaba, Oenocarpus bacaba, and pataua Jessenia bataua) can grow in both the forest and in semi-forested plantations, these would seem to be potential crop species of great importance in the tropics.

Some of the more promising tropical oil plants include:

1) Jessenia bataua PALMAE

The pataua palm grows to a height of 20 m and is found in the lowlands of tropical South America. The oil of the fruit is almost identical to olive oil in its chemical and physical properties and the biological value of its protein is almost 40% higher than that of soybean protein (Balick and Gershoff, 1981; Balick, 1985).

2) Orbignya spp. PALMAE

The South American babassu palm may reach 60 m in height. A single tree may produce up to a half-ton of fruit which resembles coconut although babassu has a higher oil content. This oil can be refined into an edible oil or used to make plastics, detergents, soap, margarine and shortening. The seedcake contains 27% protein and is an excellent fertilizer and animal feed. Its ability to colonize and thrive in deforested areas makes it an ideal species for turning degraded areas into productive lands. (Schultes, 1979; Balick, 1985).

3) Fevillea spp. CUCURBITACEAE

Seeds of the fruits of these South American vines have a higher oil content than that of any other dicotyledenous plant. Gentry and Wettach (1986) theorized that if naturally occurring lianas in a rain forest were cut and replaced by Fevillea, a per acre oil yield comparable to those obtained in the most productive plantations might be obtained without felling a single tree.

Fibers Fiber plants are second only to food plants in terms of their usefulness to man and their influence on the advancement of civilization. Tropical people use plant fibers for housing, clothing, hammocks, nets, baskets, fishing lines and bowstrings. Even in our industrialized society, we use a wide variety of natural plant fibers: for ropes, brooms, brushes and baskets. In fact the so-called "synthetic" fibers now providing

much of our clothing are only reconstituted cellulose of plant origin. It should be noted that cellulose is produced in far greater quantities by the world's plants than any other organic compound-up to 3,000,000,000 tons a day (R. E. Schultes, pers. comm.). Several trees in tropical South America could be exploited for the fiber that they produce and their commercial potential is, at this point, unrealized. Promising species include:

1) Astrocaryum tucuma PALMAE

The tucum palm reaches a height of 20 m and is native to the western Amazon. The fiber is considered to be among the finest and most durable of the plant kingdom and is particularly highly valued by Amazonian Indians. Furthermore, tucum produces an edible palm heart and a fruit which contains three times more vitamin A than carrots (Schultes, 1977; Balick, 1985).

2) Demoncus spp. PALMAE

Rattans are climbing palms native to the Asian tropics and trade in rattan end products is worth over \$1 billion a year. Unable to afford imported rattan, Peruvian peasants have begun to use Demoncus, a local climbing palm, which has proven to be a very satisfactory substitute (A. Gentry, pers. comm.).

The Role of the Ethnobotanist

Tropical forest peoples represent the key to understanding, utilizing and protecting tropical plant diversity. Virtually

every plant mentioned in this paper-not only the lesser known species like the tucum palm and the buriti, but also the well-known ones like corn and chocolate-were first discovered and utilized by indigenous peoples. While it may come as a surprise to many that modern botanists are learning about useful plants from "primitive" peoples (the science known as ethnobotany), we are in fact just getting started. A single tribe of Amazonian Indians may use over 100 different species of plants for medicinal purposes alone, yet very few tribal peoples have been subjected to a complete ethnobotanical analysis and the need to do so becomes more urgent with each passing year. As we struggle to protect the dwindling tropical rainforest and find new and useful plant species for the benefit of modern man, the people who best understand these forests are dying out. Over 90 different Amazonian tribes are said to have disappeared since the turn of the century (G. Prance, pers. comm.). Through extinction and tribal acculturation, true forest peoples are dying out and their oral traditions are disappearing with them. Each time a medicine man dies, it is as if a library has burned down. Conservationists often talk about the problem of disappearing species, but the knowledge of how to use these species is disappearing much faster than the species themselves. In order to collect this information, we need to expand ethnobotanical field research. Organizations like the World Wildlife Fund and the National Geographic Society, together with leading botanical institutes like the Harvard Botanical Museum and the New York Botanical Garden and the Missouri Botanical Garden are working to

document ethnobotanical lore. The results of this type of research are not only lists of useful species, but also data on potentially useful wild and cultivated varieties as well as ecological information on how to best utilize tropical ecosystems in a sustainable manner. The collection of this type of information, combined with expanded programs of bringing some of the more promising species into cultivation will eventually enrich our diets, and reduce our overdependence on current crop species and non-renewable industrial materials.

National Strategy

I would now like to turn briefly to the question of how a United States national strategy might best help us to reach these goals. To evaluate this question, it is helpful first to examine existing measures the United States has taken.

As the 1987 OTA report on biological diversity points out, over the past two decades the United States has adopted, either through legislation or treaty, numerous measures to preserve international biological diversity. Congress has passed landmark legislation such as the National Environmental Policy Act and the Endangered Species Act which serve as models for the rest of the world. Congress' attention to biological diversity and oversight of the Agency for International Development's policies and projects have aroused great interest within the Agency on biodiversity issues and led directly to the establishment of AID's Biological Diversity Program, which will spend more than \$4.5 million on projects this year. Congress has also shown

strong interest, welcomed by conservationists, in the environmental performance of the multi-lateral development banks. And the United States has participated in international treaties such as the Convention on Trade in Endangered Species (CITES), the Western Hemisphere Convention, and the World Heritage Convention which aim to protect biological diversity by controlling trade in endangered plants and animals, protecting wildlands, and preserving the world's natural heritage.

While we realize that the United States' record in fully supporting and funding these Conventions and Acts has been spotty at times (the Endangered Species Act, currently on hold in the Senate, has not been reauthorized for five years), we at World Wildlife Fund remain encouraged by the United States' efforts to promote awareness of the importance of preserving international biological diversity. We look to Congress to continue to guide United States policy so as to maintain the nation's position as an international leader on biological diversity issues.

World Wildlife Fund applauds your Committee's drive to promote the preservation of the nation's biological diversity as an issue of national and international significance. We hope that a strong component of any program you consider will be to reaffirm the United States' commitment to lead the way in helping tropical developing nations to protect their extraordinary biological resource bases.

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Literature cited

- Balandrin, M., Klocke, J., Wurtele, E., and Bollinger, W.
1985. Natural plant chemicals: sources of industrial and medicinal materials. Science 228: 1154-1160.
- Balick, M. 1985. Useful plants of Amazonia: a resource of global importance, In: Key Environments - Amazonia (G. Prance and R. Lovejoy, eds.). Pergamon Press, Oxford. pp. 339-368.
- Balick, M. and Gershoff, S. 1981. Nutritional evaluation of Jessenia bataua: source of high quality protein and oil from Tropical America. Econ. Bot. 35(3): 261-271.
- Caufield, C. 1982. Tropical Moist Forests. International Institute for Environment and Development, London.
- Frankel, O. 1983. Genetic principles of in-situ preservation of plant resources. In: Conservation of Tropical Plant Resources [S. Jain and K. Mehra, eds.]. Botanical Survey of India, Howrah.
- Gentry, A. and Wettach, R. 1986. Fevillea - a new oil seed from Amazonian Peru. Econ. Bot. 40(2): 177-185.

- Gibson, R. 1979. The geographical distribution, inheritance and pest-resisting properties of stick-tipped foliar hairs on potato species. Potato Res. 22: 223-236.
- Guillaumet, J.L. 1984. The vegetation: an extraordinary diversity. In: Key Environments- Madagascar (A. Jolly, P. Ogberle, and R. Albignac, eds.). Pergamon Press, Oxford. pp. 27-54.
- Harlan, J. 1984. Evaluation of wild relatives of crop plants. In: Crop Genetic Resources: Conservation and Evaluation (J. Holden and J. Williams, eds.) Allen and Anwin, London.
- Heiser, C. 1985. Ethnobotany of the naranjilla (Solanum guitoense) and its relatives. Econ. Bot. 39(1): 4-11.
- IUCN, 1980. World Conservation Strategy. International Union for the Conservation of Nature, Morges, Switzerland.
- National Academy of Sciences, 1975. Underexploited Tropical Plants with Promising Economic Potential. National Academy of Sciences, Washington, D.C.
- National Research Council, 1984. Amaranth: Modern Prospects for an Ancient Crop.

- Oldfield, M. 1984. The Value of Conserving Genetic Resources.
U.S. Dept. of the Interior, Washington, D.C.
- Plotkin, M., Randrianasolo, V., Sussman, L., and Marshall, N.
1985. Ethnobotany in Madagascar. Unpublished report to
IUCN. 657 pp.
- Prance, G. 1982. The increased importance of ethnobotany and
underexploited plants in a changing Amazon, In: Change in
the Amazon Basin. Vol. I: Man's Impact on Forests and
Rivers. (J. Hemming, ed.). pp. 129-136.
- Prescott-Allen, R. & P., 1982. What's Wildlife Worth?.
International Institute for Environment and Development,
London.
- Prescott-Allen, R. & P., 1983. Genes from the Wild.
International Institute for Environment and Development,
London.
- Princen, L. 1977. Potential wealth in new crops: research and
development. In: Crop Resources. D. Siegler, ed., Academic
Press, New York.
- Schultes, R.E., 1977. Promising structural fiber palms of the
Colombian Amazon. Principes 21(2): 72-82.
- Schultes, R.E. 1979. The Amazonia as a source of new economic

plants. Econ. Bot. 33(3): 259-266.

Tyler, V. 1986. Plant drugs in the twenty-first century.

Econ.Bot. 40(3): 279-288.

Vietmayer, N. 1986a. Exotic edibles are altering America's diet and agriculture. Smithsonian 16(9): 34-43.

Vietmeyer, N. 1986b. Lesser-known plants of petential use in agriculture and forestry. Science 232: 1379-1384.

Wang, S. and Huffman, J.B. 1981. Botanochemicals: supplements to petrochemicals. Econ. Bot. 35(4): 369-382.

White, J. 1979. The growing dependency of wood products on adhesives and other chemicals. For. Prod. Jor. 29: 14-20.

Witt, S. 1985. Biotechnology and Genetic Diversity. California Agricultural Lands Project, San Francisco.

Mr. BROWN. Thank you very much, Dr. Plotkin, for that illuminating display of slides, as well as your testimony.

Miss Schneider.

Miss SCHNEIDER. Dr. Plotkin, let me begin with you by mentioning that there is a hopeful note, insofar as your sharing with us so many of the plants that have originated in the Amazon and in Central and South America.

The fact that Brazil is in the process of developing their constitution and that they have just included an article in their constitution which focuses on conservation and the environment, I think, sends an important signal to us, that there is leadership happening south of the border, and that in the United States—we don't have that in our Constitution—we had at least better get our act together.

But can you tell us a little bit about some of the new products that are coming from plants, both domestic and otherwise, that we should be alerted to for the future?

Dr. PLOTKIN. Well, Indians in this country have long used the resin of the Mayapple plant, which you can see growing in Rock Creek Park, to burn off warts. Recent work on this plant by Bristol Myers resulted in a new cancer treatment called etoposide, I think, based on protophyllotoxin, which is extracted from the Mayapple. It's a semi-synthetic form of that, which is coming on line in this country.

In Mexico, interestingly enough, work on the hallucinogenic mushrooms has resulted in a recent development of a beta blocker that is to treat cardiac ailments, based, once again, on a synthetic form of the naturally occurring psilocybin.

So, the outlook is bright, but it's a question of preserving the plants and preserving the knowledge of which plants we need to focus on.

Miss SCHNEIDER. Perhaps the biologists need to incorporate a little economics into their presentations, as you have, so that we can get that message clearly across that there is our economic and medicinal well-being at stake.

I wonder if you can talk a little bit about the effects of the U.S.-sponsored drug eradication programs on biodiversity in the Andes?

Dr. PLOTKIN. Well, the Andes are the breadbasket of the Americas. Most of the economic plants that have come out of the Americas—and we're talking food, medicine, and industry; everything from quinine, which is our front-line drug against malaria, and it's also used to treat cardiac ailments; to some of the food plants that I've shown—originated in the Andean area.

It's an emotional issue, but I can't help but be a little surprised and perhaps even more than a little appalled by the fact that we are going to go and spray poison on one of the richest areas for biological diversity in the world. And I think that Eli Lilly is to be commended for refusing to allow its chemicals to be used for this purpose.

Now, the drug issue is a very complicated one, and I don't want to simplify it. But I think that anybody interested in biological diversity needs to look at this issue, as well.

Miss SCHNEIDER. Thank you. I'd like to focus a little bit about NEPA with the other panel members.

Mr. Flamm, you had proposed in your testimony a mechanism that would require compliance with NEPA. The mechanism you're suggesting, I think, is a little bit more elaborate than the current version of our bill.

And, yet, Dr. Campbell, you're suggesting that perhaps amending NEPA is not necessary, and that Congress should instruct CEQ to revise its regulations instead.

I wonder if we could have a little discussion of that, and involve some of the other participants, too. Dr. Campbell, is your recommendation adequate, just that CEQ revise their regs?

Dr. CAMPBELL. I would hope so, primarily because we are a little afraid of what would happen if you start pursuing an amendment to NEPA. It is not, obviously, that we disagree with the goal.

I think it's interesting that, when the question was asked of the three federal officials, they all agreed that NEPA clearly requires them to deal with pieces of it. And they're certainly right that the history of application of NEPA has not dealt with the whole pie, only with the pieces.

We strongly support efforts to require dealing with the whole pie, and we would not oppose an amendment addressed to that. But, as I say, we are a little concerned about which other interest groups might come in with proposed amendments if this policy followed.

Miss SCHNEIDER. Understood. OK.

Dr. CAMPBELL. I have not had a chance to see the Wilderness Society's specific recommendations. I would be very interested to see what they are.

Miss SCHNEIDER. OK. Dr. Cutler.

Dr. CUTLER. I'm sure a review of the legislative history of NEPA will reveal concern for what we might call today biological diversity. It might have been called something else during that debate and amendment and adoption.

But the process of writing regulations to implement statutes is a process that provides for some flexibility and the evolution over time of the responsible agency's interpretation of what Congress intended, and regulations are often revised to improve them.

While we could come up with a number of improvements in NEPA to reflect our increased understanding of natural processes, and take advantage of 18 years experience under the National Environmental Policy Act, I don't think we'd need to.

I think it's probably true, as Dr. Campbell suggested, a comprehensive rewrite of our NEPA regs, including specificity when it comes to covering this issue, the impact on biological diversity, is probably adequate.

Miss SCHNEIDER. You had mentioned, since—Well, yes, Mr. Flamm?

Mr. FLAMM. Well, if I could comment, since I triggered this debate.

Miss SCHNEIDER. Sure.

Mr. FLAMM. By way of a little background, I got involved in NEPA right after passage of the act, and helped the Forest Service at that time set up their procedures. I later went to CEQ for 3½ years and helped them write the first regulations. And later I

headed the environmental program with Dr. Cutler, under Dr. Cutler, at the Department of Agriculture.

Although I would agree that it's possible to revise those regulations, I think it would be much more certain and much more likely to happen the way it should happen if this was written in law.

Now, all of us are very concerned about amendments to NEPA and opening the door. Well, the door has been opened in the past, a weakening amendment.

I think the issue of biological diversity is so important. And, since there's obviously some disagreement on how extensive the requirement is, we think that a provision to require biological diversity to be thoroughly addressed in the NEPA process and EIS is necessary and would be an important part of this bill.

Miss SCHNEIDER. Dr. Cutler.

Dr. CUTLER. Another related need in the bill that our prepared detailed statement covers—it's relevant to the current discussion—has to do with a provision that we think should be added to give citizens an explicit opportunity to sue to enforce the law.

Either in section 5 or in a separate section, the Congress should provide that any person may bring an action in Federal court to enforce any requirement of the act. And we think attorneys' and expert witnesses' fees and costs should be awarded to any substantially prevailing plaintiff.

Miss SCHNEIDER. OK. Well, the Forest Service, I guess—I had missed this part of their testimony—but evidently they were not at all enthused about that portion of your recommendation.

Dr. CAMPBELL. We think it should be built into any environmental statute to permit third-party enforcement.

Miss SCHNEIDER. I think history has proven—and I have been, prior to coming to Congress, part of that proof—that oftentimes we do not get federal agencies to move until we do have the power to hit them over the head with a legal club. So, I think that there certainly is some value in what you're suggesting.

One of the other things, while we're chatting, that you had mentioned is—I think we all agree that defining biological diversity is a very difficult task. I wonder if you could elaborate a little bit on your concept, where you state significantly decreased viability?

Dr. CUTLER. Well, it could have to do with a species surviving. The most obvious species that are in difficulty are the large species that are typically in small numbers and require large habitats in which to survive.

One of the members of this panel—I think it was Mr. Pissot—talked at length about the problems that the spotted owl is having in surviving in the Pacific northwest, where the logging of the old-growth forest is proceeding so rapidly that it's leaving the owls without sufficient habitat to survive, or without these riparian riverine corridors of undeveloped habitat to move from one wilderness area to another, or from one island of spotted owl management area to another.

Another example is the Florida panther, found in the Everglades and in the adjoining Big Cypress Preserve. We've just seen a videotape of the Florida panther, indicating that some of the individuals are suffering from inbreeding. Their hips aren't working right. Their legs aren't working right. They're becoming feeble.

There are just a few left. They're breeding with each other in this small population, and they're not doing very well. They are a relict population, and they will grow extinct. That's the kind of lack of viability that results from fragmentation of habitat.

The same could be said of a community of plants and animals from which a number of species have been removed. The web of life is destroyed and the relationships aren't normal. The predator/prey relationship or balance is upset, and therefore not viable.

Scientists should be able to tell us ecosystem by ecosystem what species constitute that ecosystem and the welfare of those species, so that, if one or more species becomes on its way to becoming absent, something can be done about it.

MISS SCHNEIDER. OK, Mr. Pissot, one of the points that you mentioned was that you felt that existing laws concerning biodiversity are neither adequately funded nor enforced. There were little threads of that same kind of comment in most everyone's testimony's here. I can only add that almost every other day I get a phone call from somebody or other mentioning how one Federal agency has failed to observe this law or failed to take action on that or that they are going to allow the pandas to come to the United States for this reason and that, and I think that there certainly is enough evidence that the Federal agencies are not doing what Congress had intended.

I'd like to see if there is a consensus among the panel members that either there is a lack of authority or there is not a lack of authority, or does it really come down to a situation of there being a lack of will and perhaps H.R. 4335 would strengthen that will by highlighting the issue and making it explicitly a national policy?

Dr. Cutler.

DR. CUTLER. It has occurred to me that it is a lack of political will as well as the fact that there is some—it is an emerging discipline. That is, the expertise is just coming together. For example, there is a new scientific association called the Society for Biology Conservation that's just begun publishing a new journal. It's devoted to these interrelationships.

As in the Carter administration, Stuart Eisenstadt, for example, was head of domestic policy. If someone at that level would direct that the executive branch get its act together on this issue, either through CEQ or through the Secretary of the Interior or someone at that level and moved ahead with the benefit, if not in this case with a statute, at least a President's Executive order that this is a executive branch-wide priority, and assign someone like the Secretary of the Interior to see that this happened and detailed people or assigned people to a staff to see that it happened, something like the Water Resources Commission that has been abolished and that used to provide good coordination.

Back when Mr. Flamm used to be on the staff of the Council on Environmental Quality that had some influence, before it's been totally emasculated in the last few years—I hesitate to even refer anything to CEQ anymore or refer to CEQ because it is a shadow of its former self. But if the President was really behind CEQ and behind the biological diversity program and if there was an inter-agency task force of the kind described in this bill, and if there was a national natural heritage inventory, so that all these agencies,

Federal and State, were aware of the status of all of the ecosystems in the United States and which were the most endangered, so that priorities could be assigned to line acquisition in management, we could get someplace.

It does take leadership, but I think your leadership in the form of providing congressional direction and policy is probably the first step.

Mr. SCHEUER [presiding]. Excuse me, I will recognize both of you. Would you just elaborate on your comment that the CEQ is just a shadow of its former self?

Dr. CUTLER. I can't tell you what the manpower changes have been, but I know that it might as well not exist right now as far as its influence on Government policy. We just never hear of it from month to month, from year to year.

In the first few years of its existence, when they were drafting the first regulations to implement the National Environmental Policy Act, task forces on many important subjects, the executive branch in effect was being given leadership by CEQ. Today it might as well not exist.

Mr. SCHEUER. Is that because of the quality of its members, the point of view of its members and its chairman, perhaps, or is that a factor of the emasculation of the staff capability?

Dr. CUTLER. It probably starts at the top. I mean, this is put out from the Executive Office of the President and the President has to say, "this is important" and let his Cabinet officers know the direction from CEQ is equivalent of direction from the President and the President should be producing a regular report on the state of the American environment as produced by CEQ and stand with the Chairman of the Council on Environmental Quality in public forums from time to time, letting the American public, the staff of the Council on Environmental Quality, his Cabinet, his executive branch know that environment is a high priority in this administration and that CEQ speaks for the President and then someone might listen, but that hasn't been the case in the last 8 years.

Mr. SCHEUER. Dr. Campbell.

Dr. CAMPBELL. Yes, to return to Congresswoman Schneider's question, although this is all related, exactly as Rupert Cutler says, if the President cared we wouldn't have these problems. The agencies have adequate authority, I believe, to do this. They do not, however, have instructions that they cannot avoid that they must do it, and so we are dependent at this point on the interest and dedication of the President and the people that he appoints to head up these agencies and to some extent then on the Senate, which confirms many of them.

This question has not, unfortunately, become a matter of interest in the confirmation process. I believe that what you are trying to do and what the Congress needs to do here is somehow create both a policy with enough enforcement teeth that these agencies have to pay attention to this issue, whatever the passing fancy of whoever happens to be the Chief of that agency and the head of our executive branch.

That is difficult. I am not sure that the bill as now drafted goes far enough. Some of my colleagues have suggested some ways to put more teeth in it and I think that would be important to follow

through on. This is much too much an important issue to leave to the passing whims of whoever gets appointed the Secretary of the Interior or whether the President chooses to listen to the Council on Environmental Quality. Unfortunately we can't guarantee that.

Mr. PISSOT. Congresswoman Schneider, Mr. Chairman, in the Forest Service's recent efforts to revitalize or perhaps animate for this first time their threatened or endangered and sensitive species program, they have identified a number of needs from the field level to the level of the Chief that the program would have to provide. Two of those were additional funding and a firm agency commitment from the top down. We are pleased to have been a part of the effort to have acquired a \$5 million enhancement for the Forest Service T&E program in the Appropriations Committee yesterday, and we feel that the boost, if you will, from H.R. 4335 that states that conservation of biological diversity is a national priority is the second half of the two components that the Forest Service said were necessary for their program to get off the ground.

That is why I am surprised that there is resistance to this, because it is exactly the sort of thing that was identified at the workshop.

Dr. PLOTKIN. Yes, one other comment—my understanding is that part of the importance of this bill that we are talking about is that it's going to set an example to other countries around the world of how we value biodiversity, but under the current administration our record has been rather spotty in supporting conventions and acts that we are signatory to, so I think that we have to make the same position across the board and support things that we have already said we are going to support and pay dues to places that we already pledged to pay dues to. Once again, this lack of interest or outright hostility in some cases has really worked to the disadvantage of conservation in this country and around the world.

Miss SCHNEIDER. I would just like to ask one last informational question, a speedy question. I know from my own informal polls that protection of the environment and emphasis on conservation on the part of the Federal Government is a top priority, but I wonder if any of you can help me document that. Have any of your respective organizations been doing polling data or do you have such information that you are using for this next Presidential term?

Yes, Dr. Plotkin.

Dr. PLOTKIN. I can't give you scientific polling data, but we have had something very interesting happen at the fund recently. I am sure you are aware of the controversy over the pandas in the Toledo zoo, which has brought these things in when it has become very apparent that the pandas are in real trouble in China. It has been said that the World Wildlife Fund is just doing this as a publicity stunt and they want to have a monopoly on pandas.

Well, we of course were concerned about how this would affect our membership, to be portrayed negatively in the press. Interestingly enough, many of our supporters have written in with increased contributions, saying that they are concerned about the environment and even though an organization may be getting bad press, they are reading between the lines to make sure that diversity is protected at home and abroad—so it is not the scientific data

perhaps you are looking for, it is more anecdotal, but it is something we have all been pleasantly surprised by.

Miss SCHNEIDER. Great, thank you. Dr. Cutler.

Dr. CUTLER. In the same vein that Defenders of Wildlife, for whatever reason, our direct mail income from our new member solicitation and fund appeals to our own members is up 25 percent this year over last year, and as I noted earlier, the public service print ads we have had in national magazines to restore the wolf to Yellowstone Park have resulted in several thousand inquiries of very enthusiastic people.

The membership of our organizations continues to grow. There is just a higher plateau of expectation about environmental quality. I'm sure that the American public will not stand for degradation of its environment.

Miss SCHNEIDER. Yes.

Mr. FLAMM. We're having a similar experience at The Wilderness Society. Our members have doubled over perhaps the last two years and our appeals have been highly successful, so it is a pattern. I can't quote them off the top of my head, but I have seen several public polls that continue to show that the American public supports environmental quality, pollution control and that they are willing to pay for it, and I can get you a list of those.

Miss SCHNEIDER. That would be very helpful in the formation of platforms and positions and that sort of thing for some folks.

Yes, Dr. Cutler.

Mr. SCHEUER. If you would supply that to the committee, we'll make it a part of our record.

Mr. FLAMM. All right.



THE WILDERNESS SOCIETY

June 17, 1988

RECEIVED

JUN 20 1988

The Honorable James H. Scheuer
Chairman, Subcommittee on
Natural Resources, Agriculture
Research and Environment
Committee on Science, Space and Technology
338 House Annex 2
Washington, D.C. 20515

JAMES H. SCHEUER, M.C.
WASHINGTON, D.C. 20515

Dear Congressman Scheuer:

At the June 9 hearing on the National Biological Diversity Conservation and Environmental Research Act, I promised to submit information pertaining to public opinion supporting environmental protection. I have summarized, for your use, nine public opinion polls taken from 1981 to 1986, which show strong support for environmental regulations.

I appreciated the opportunity to testify before your committee and wish to again thank you for your efforts to protect biological diversity.

Sincerely,

Barry Flamm
Chief Forester

BF:ldg
Enclosures

Lou Harris, 1986 - Strong support for wide range of environmental issues.

Market Opinion Research, 1986 - For President Commission on Americans Outdoors, underwritten by the National Geographic Society, showed strong support by the American public for the government to preserve natural-areas for use by future generations.

American Forest Institutes, 1985 - A significant majority of Americans believe that public forests are very important to protect water, wildlife and areas of great natural beauty.

Gallup Poll, December 16, 1985 - Americans support protection of the environment 2 to 1 over economic growth.

CRI Opinion Update, 1984 - "A 56 percent majority of Americans feel a need for more government regulations to protect the environment."

Los Angeles Times Poll, April 4-10, 1983 - Government control is insufficient to protect the environment against waste dumps, water and air pollution, pesticides, etc.

The Continental Group of Stamford, Conn., 1982 - A majority of Americans favor retaining existing environmental laws even if that forces further factory closings or a reduction in energy production.

Lou Harris, 1982 - By 85 to 10 percent, a majority supports "strict enforcement of air and water pollution as now (1982) required by the Clean Air and Clean Water Acts."

Democratic National Committee Poll, 1981 - Two thirds of public took position favoring stronger environmental regulations.

The Harris Survey

For Release: Monday AM, May 19, 1986

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ENVIRONMENTAL ISSUES COULD BECOME A FACTOR IN CONGRESSIONAL RACES

By Louis Harris

Despite the relatively low-key attention paid to environmental problems such as acid rain and toxic waste dumps, the American people are nearly unanimous in their feeling that contamination problems are getting more serious and their impatience is now beginning to show. This is according to the Harris Survey conducted by telephone between April 5th and 8th, among a national cross section of 1,254 adults.

Indeed, in the upcoming off-year elections, one of the real sleeper issues may well be that of environmental controls. Here is how the issue might work, for example, in the case of toxic and hazardous wastes:

-- A big 93-6 percent majority of the public nationwide believes that "pollution of lakes and rivers by toxic substances from factories" is a serious problem. An almost as high 92-6 percent majority feels the same about "disposal of hazardous wastes." Obviously, nearly everyone in the country is worried about how to clean up toxic waste dumps.

-- By 67-29 percent, another substantial majority favors passage of the \$10 billion extension of the super-fund hazardous waste clean up program for the next five years. Congress has delayed passage and has just barely extended the program a few months at a time. Clearly, the public is getting impatient and upset at the lack of decisive action by Congress on the clean-up of hazardous wastes.

Finally, when the public was asked what would happen if a candidate running for Congress in their district were to take a position on an environmental issue which they disagreed on, 16 percent said they would "certainly not vote for that candidate." This means that the environmental issue alone could affect as much as one vote out of every six. But when this overall indication is divided into those who are pro-environmentalist and those who are anti-environmentalist, a decisive and critical balance emerges. While the anti-environmental vote could muster 6 percent of the electorate to vote against a pro-environmental candidate, a much higher 10 percent of the electorate say they would certainly vote against an anti-environmentalist candidate.

Thus, the pro-environmental forces have a net four point balance in their favor. This may seem to be a small number of voters, but a swing of four points could easily mean the difference between Democratic or Republican control of the U.S. Senate this year. It could also account for the difference between a five or 10 seat pick-up for the Republicans, which might give Republicans and southern Democrats working control of the House. Or it could mean a net gain of 10 or 12 seats for the Democrats which could give the northern wing of that party solid control over the House.

The temper of the public is to be critical of business and the way it has handled environmental matters, as well as to be critical of the Republicans. For example, when asked which party they felt could do a better job of protecting the environment, the Democrats come out on top of the GOP by a substantial 49-32 percent margin.

But the mandate about business and the environment in many ways is more serious:

-- When asked who should pay for an injury to a person living near a landfill, and when it cannot be determined that the injury was caused by wastes from a specific company, a big 58 percent feel that the companies using the landfill should pay and another 31 percent feel that the industry producing the waste should pay. By comparison, no more than 5 percent think the government should compensate the victim of such injuries.

(over)

-- A substantial 79-17 percent majority of the public is convinced that "pollution from acid rain" is a serious problem. A big 73-23 percent majority of the public is convinced that a substantial part of the costs required to clean up acid rain should be borne by "the shareowners of investor-owned electric utilities." This contrasts with a much lower 51-45 percent majority who feels that such costs should be borne by "electricity consumers nationally" and the narrow 49-46 percent plurality who feel the costs should be paid by "electricity consumers in eastern and southern states where most coal and oil is burned."

There are those in politics who feel that the environmental issue has cooled appreciably over the past few years. This evidence would not indicate that. To the contrary, it would suggest that big majorities of the American people are deeply upset at what they feel is the lack of progress on cleaning up toxic waste dumps and acid rain. And, it could well be that in 1986, they mean to do something about it at the polls.

TABLES

Between April 5th and 8th, the Harris Survey asked a nationwide cross section of 1,254 adults by telephone:

"I'm going to read you some different kinds of environmental problems. For each, would you please tell me if it is currently a very serious problem, a somewhat serious problem, only a small problem, or no problem at all in this country?"

SERIOUSNESS OF ENVIRONMENTAL PROBLEMS

	Very Serious	Somewhat Serious	Only a Small Problem	No Problem At All	Not Sure
Disposal of hazardous wastes	68	24	5	1	2
Pollution of lakes and rivers by toxic substances from factories	65	28	5	1	1
Contaminated drinking water	55	31	11	2	1
Pollution by radioactive wastes from nuclear power plants	49	30	15	4	2
Pollution from acid rain	42	37	13	4	4
Air pollution by coal-burning electric power plants	30	45	18	4	3

"Although experts disagree on the environmental impact of rainfall with high acid levels, most agree that acid rain is caused by sulfur emissions from electric utility plants that burn coal and oil and by nitrogen oxide emissions from cars and trucks. If Congress passed a law that required (READ EACH ITEM) to shoulder the substantial costs of cleaning up acid rain, would you consider such a law fair or unfair?"

ACID RAIN CLEAN-UP -- WHO SHOULD PAY

	Fair	Unfair	Not Sure
The shareowners of investor-owned electric utilities	73	23	4
Electricity consumers nationally	51	45	4
Electricity consumers in eastern and southern states where most coal and oil is burned	49	46	5

(continued)

"When it cannot be determined that an injury to someone living near a landfill was caused by wastes from a specific company, who do you think should pay for an injury to such a person -- the government, through general tax revenues, the industry that produces the waste, through a special tax on that industry, or a combination of companies that used the landfill?"

INJURY TO PERSON LIVING NEAR LANDFILL -- WHO SHOULD PAY

	<u>3</u>
Government	5
Industry producing waste	31
Combination of companies using landfill	38
None of these (vol.)	2
Combination (vol.)	3
Not sure	1

"Congress has delayed passing a bill that will extend the super-fund hazardous waste cleanup program for five years at a cost of \$10 billion. Do you favor or oppose Congress passing such a super-fund hazardous waste cleanup program appropriation of \$10 billion."

FAVOR CONGRESS PASSING SUPER-FUND BILL

	<u>3</u>
Favor	67
Oppose	29
Not sure	4

"Now suppose in the congressional elections this year, you found a candidate for Congress in your district whose views you mostly agreed with. Then suppose that candidate took a position on controlling air and water pollution and cleaning up acid rain and toxic waste dumps that you disagreed with completely. Would you certainly not vote for that candidate, probably not vote for that candidate, or could you still vote for that candidate?"

VOTE FOR CANDIDATE WITH DIFFERENT STAND ON ENVIRONMENT THAN YOURS?

	<u>Could Not Vote For</u>	<u>Probably Not Vote For</u>	<u>Could Still Vote For</u>	<u>Not Sure</u>
TOTAL	16	44	36	4
Pre-environment (Base: 67 percent favor in previous question)	10	29	25	3
Anti-environment (Base: 29 percent oppose in previous question)	6	13	10	0

* = less than 0.5 percent

(over)

THE HARRIS SURVEY

May 19, 1986

-4-

METHODOLOGY

This Harris Survey was conducted by telephone within the United States between April 5th and 8th, among a cross section of 1,254 adults nationwide. Figures for age, sex, race and education were weighted where necessary to bring them into line with their actual proportions in the population.

In a sample of this size, one can say with 95 percent certainty that the results have a statistical precision of plus or minus three percentage points of what they would be if the entire adult population had been polled.

This statement conforms to the principles of disclosure of the National Council on Public Polls.

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64 East Concord Street, Orlando, Florida 32801

MARKET OPINION RESEARCH



DRAFT

PARTICIPATION IN OUTDOOR RECREATION AMONG AMERICAN ADULTS
AND THE MOTIVATIONS WHICH DRIVE PARTICIPATION

Presented to the
President's Commission on Americans Outdoors

Underwritten by the
National Geographic Society

by Market Opinion Research

March, 1986

PLEASE NOTE: This copy of the draft report includes only the executive summary and the introduction. Other chapters are listed here for your information, but printed copies of the chapters are unavailable pending final revisions.

MARKET OPINION RESEARCH

OUTDOOR RECREATION AND GOVERNMENT POLICY

The American adult public in early 1986 is in substantial agreement with these seven ideas which impact on what government policy should be with respect to outdoor recreation. The strength of agreement is greatest with the first idea and least with the last, but still majority agreement across all demographic, geographic and motivational subgroups of the public.

- The government should preserve natural areas for use by future generations.
- Preservation of the natural environment is important for recreation.
- More parks and recreation areas are needed near large cities.
- The national government should continue to give financial assistance to local and state government for outdoor recreation.
- I am willing to pay taxes which are dedicated to preserve natural areas of our country.
- Local, state or national government should provide access to beach and waterfront property on oceans, lakes and rivers.
- Maintaining the land and parks already available is more important than adding more parks.

The public makes fairly sophisticated distinctions as to which outdoor recreation costs should be paid for by taxes and which by user fees. Only 13% think everything should be paid by taxes and only 9% think everything should be paid by user fees. Not surprisingly, the fee-only group are lower users of park facilities. The tax-only group tend to be younger, frequent park users. The important finding is that there is a consensus view shared by 73% of American

TABLE 3: WHY DO WE NEED PUBLIC FORESTS?

Question - At the present time the federal government is reviewing what it should do with millions of acres of forests and grasslands that it owns. Most of the land under review is in the Western states. In making this review, we must consider all the various uses of this land, such as logging and recreation. How important are each of the following uses?

Results - Responses based on a telephone survey of a random sample of 1,100 adults in July 1985.

<u>Uses</u>	<u>Very Important</u>	<u>Fairly Important</u>	<u>Not Important</u>	<u>Don't Know</u>
(percent of respondents)				
Protect water supply	94	5	1	--
Protect wildlife habitat	76	17	6	1
Protect areas of great natural beauty	71	22	7	1
Develop energy sources	65	23	10	3
Provide areas for tree farming in order to increase supplies of lumber and paper.	64	27	9	1
Protect local jobs (for example, don't change logging area into wilderness area).	44	35	17	4

SOURCE: The American Forest Institute, The Forest Industry in Perspective, November 1985.

As part of a new vision for the national forests, we recommend that the Forest Service stop selling timber at prices that do not recover the direct costs of growing and selling trees. Only if there is a site-specific demonstrated, over-riding benefit to other forest uses and only if logging is the least cost method of providing that benefit should below-cost timber be cut.

This prescription recognizes that the basic problem of public sector forestry is to find the set of activities -- including specific timber sales -- that maximize net public benefits from our national forests. Within this framework, a very large percentage of below-cost timber sales cannot be justified.

Over the next several years, the Forest Service -- like many federal agencies -- is going to be required to make significant budget reductions. Rather than accept budget cuts handed down by Congress or the Office of Management and Budget, we recommend that the U.S. Department of Agriculture act immediately to reduce timber program expenditures that underwrite logging on sites with high operating costs and low timber values. This action will save taxpayer dollars, reduce environmental damage, and retain society's future options for the uncut forests.

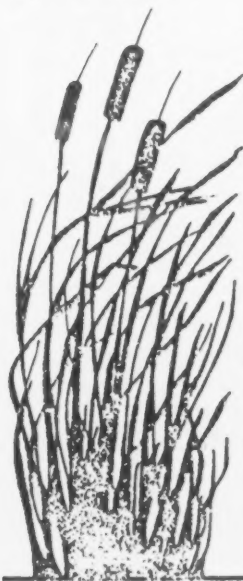
CRI/ OPINION UPDATE

FOURTH
QUARTERHighlights from
recent national
public opinion
surveys 1984

CRI's regular update of attitudes toward environmental issues reveals several dramatic increases in pro-environmental sentiment. Since other data show that people's perceptions about environmental quality have remained relatively stable over the last year, these shifts perhaps signal rising concern over the Reagan Administration's environmental policies — a source of controversy throughout the last 4 years.

THE ENVIRONMENT GROWING COMMITMENT TO THE FIGHT AGAINST POLLUTION

Our most recent
findings
indicate that:

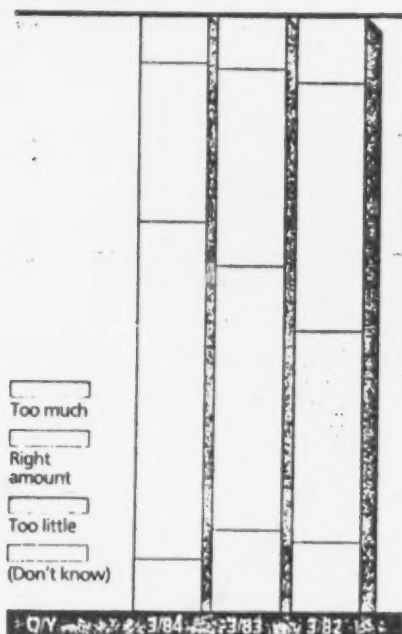


 A 56% majority of Americans feel a need for more government regulation to protect the environment. The group taking this position has swelled 21 points in just the last 2 years.

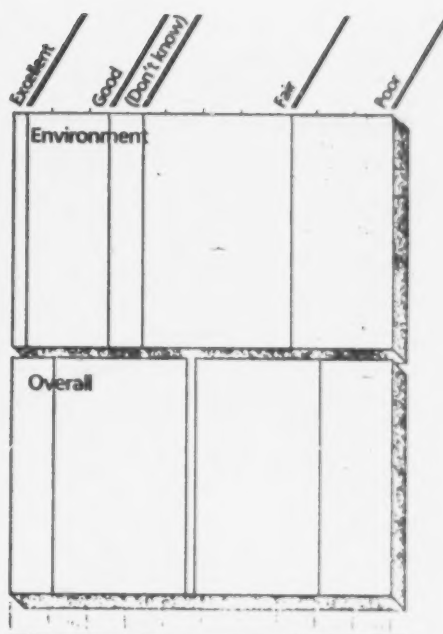
 Only a quarter of the population give Ronald Reagan positive marks for his performance on the issue of environmental protection. This is barely more than half the number who give Reagan good or excellent marks for his overall performance as President.

 The public is much less convinced than 5 years ago that industry is devoting a sizable amount of money to curbing pollution. And, even if convinced that industry had eliminated 95% of its polluting activities, more than three out of four people say they would consider it at least somewhat important to clean up the last 5%. This represents a 14-point increase since 1979 in the proportion of people who favor business eliminating all its pollution-causing practices.

In general, do you think there is too much, too little, or about the right amount of government regulation and involvement in the area of environmental protection?



Presidential ratings for overall performance and for environmental protection

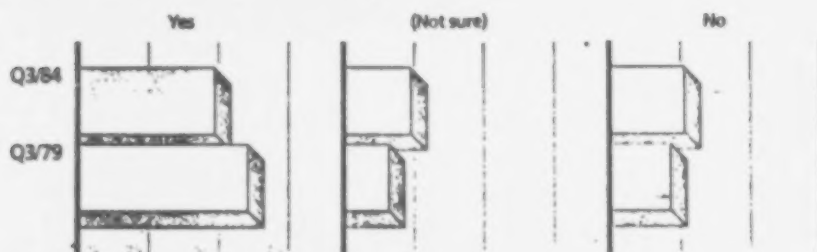


In the last 2 years there has been a striking 21-point surge in the number of Americans calling for stronger environmental regulations. This group is now a clear majority, outnumbering better than two to one the group who favor maintaining the regulatory status quo. We see little change since 1982 in the proportion of people demanding a cutback in environmental regulations, simply because that position was nearly as unpopular 2 years ago as it is today.

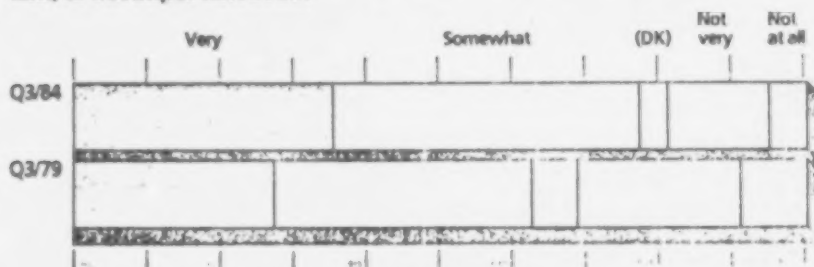
This shift in favor of expanding environmental regulations is clearly at odds with the thrust of the Reagan Administration's policies, so it is not surprising that only one in four people give the President positive marks for the job he is doing protecting the environment, while two out of three give him fair or poor marks. By comparison, the public is closely divided between positive and negative assessments of Reagan's overall performance in office.

Methodology: The data for this analysis come from surveys conducted as part of CRT's regularly scheduled public opinion survey program. The surveys are based on in-person interviews with approximately 1,500 respondents selected to represent the adult American population. More in-depth analysis of these and other topics is available in CRT's syndicated publications — Cambridge Report, Quarterly Opinion Review, and Quarterly Opinion Briefing. DK = Don't know.

Some people say that business and industry have spent large sums of money in the last 10 years improving industrial plants so that they will do less damage to the environment. For example, the plants will cause much less air and water pollution. Do you think this is true? Has industry spent lots of money and improved their plants, or not?



If it were true that 95% of industry's pollution-causing practices were gone, and water, for example, was "fishable and swimmable," how important to you personally would it be to have industry get rid of the last 5% of pollution? Would it be very important, somewhat important, not very important, or not important at all?

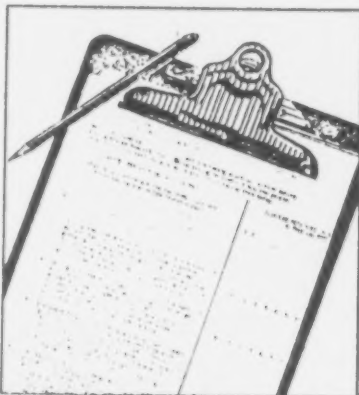


A near-majority of Americans believe industry has made a large financial commitment to cleaning up the environment over the last decade. But this positive view is far less widespread than it was 5 years ago, when more than three out of five people believed industry was putting a lot of money into the cleanup effort. The shift has largely been toward uncertainty, however. As in 1979, only around a quarter of the population feel industry is failing to make an effort to fight pollution.

As evidence of the public's strong desire to clean up the environment, more than three-quarters of the population say they would consider it at least somewhat important to shoot for a goal of zero pollution on the part of business even if US industries had cleaned up 95% of their pollution-causing practices. The number of people taking this position has increased 14 points over the last 5 years.

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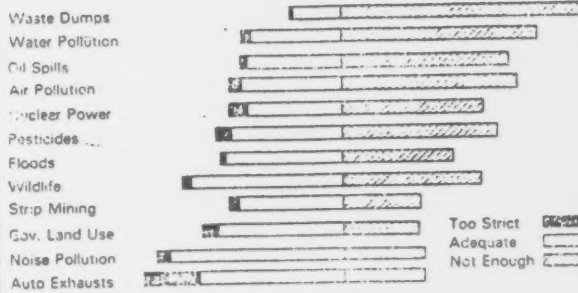
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LOS ANGELES TIMES 14 april 1983 thursday (cont'd)

POLL: Aides' Abuse of Public Trust Perceived

Government Controls on the Environment



Poll Finds Broad Support For Environmental Laws

By Dale Russakoff
Washington Post Staff Writer

A majority of Americans favor retaining existing environmental laws even if that forces further factory closings or a reduction in energy production, according to an extensive opinion survey on the subject.

The survey, conducted for the Continental Group Inc. of Stamford, Conn., a major energy, forest products and packaging company, is billed as the most comprehensive study ever made that documents a persistent "environmental ethic"—spanning business leaders and the unemployed, liberals and conservatives—in the face of economic hard times.

The study is significant because, unlike other opinion polls, it required participants to weigh their support for environmental protection against such possible alternatives as slower economic growth or higher consumer prices.

Based on interviews conducted last February and March with 1,310 people selected to mirror the national population, plus 263 corporate executives and 343 members of environmental groups, the survey found:

- 55 percent of those interviewed favor maintaining present air pollution standards "even if some factories close as a result."
- 56 percent favor keeping current environmental regulations "even if it slows the production of more energy."
- 60 percent favor giving priority to environmental cleanup "even if companies have to charge more for their products and services."

At the same time, 70 percent of those interviewed said they had been hurt by the current economic recession. One unusual finding showed stronger sentiment for protecting the

environment among people who were looking for jobs than among those employed full time.

The findings, released by Continental Group board chairman and chief executive officer S. Bruce Smart Jr., could have public policy implications since the Clean Air Act and Clean Water Act are up for reauthorization in Congress.

They reinforce earlier polls by Louis Harris Associates, which found 83 percent of Americans favor keeping the Clean Air Act intact or stiffening it, in the face of administra-

tion proposals to relax several standards. White House polls also have shown strong public opposition to weakening environmental regulations, despite general support for reducing regulatory burdens on business.

Smart said Continental undertook the study in part because federal environmental regulations affect a wide range of the company's activities: packaging, forest products and oil and gas exploration.

Since public sentiment could influence future regulations, "we thought it would be useful for our own purposes and society at large to determine where the public and environmental and business leaders were on this supposed tradeoff," said Smart, a board member of the Nature Conservancy, a business-oriented environmental group.

The survey, conducted by Research and Forecasts Inc. of New York, cast doubt on some familiar stereotypes. For example, despite the general view of business as anti-environment, the survey found strong support among corporate executives for strong environmental protections. And despite the support for strong environmental laws, 71 percent of those polled saw government regulation of business does more harm than good.

Meanwhile, the study found that major corporations rank last in public trust among a group of 10 American institutions, including the medical community, higher education, the press, organized religion and environmental groups.

Environmental groups hailed the findings. "There has been a growing realization of the consequences of environmental damage," said the Wilderness Society's Bill Turnage. "The fact of the matter is that the public is not crazy. They are not motivated predominantly by money."

On Nov. 2, No Swing To the Right Expected

By Louis Harris

Elections Nov. 2 will not be marked by a swing to the right among the nation's voters.

Public opinion across the country is hostile to a series of positions staked out by the Moral Majority and the conservative right, according to the latest Harris Survey conducted by telephone between July 9 and July 14 among a national cross-section of 1,250 adults:

- By 62 to 31 percent, a 2-to-1 majority is opposed to "a constitutional amendment to ban legalized abortion." Although this measure has been favored by the anti-abortion movement, public opposition to the amendment has remained strong since it surfaced in the 1980 campaign, when voters opposed it by 61 to 34 percent.

- By 59 to 37 percent, a majority favors passage of the Equal Rights Amendment, despite the fact that ERA failed to win ratification before its June 30 deadline. Although the current majority favoring ERA is down somewhat, it is still the fourth highest ever recorded in favor of its passage.

- By 66 to 31 percent, a majority favors "a federal law requiring that all handguns people own be registered by federal authorities," up slightly from 64 to 34 percent who supported anti-handgun legislation in February.

- By 69 to 21 percent, a majority supports "federal laws requiring af-

firmative action programs for women and minorities in employment, provided there are no rigid quotas;" in February the tally was 68 to 24 percent. Sentiment favoring affirmative action has been virtually unchanged since 1978.

On two other issues that have stirred up substantial controversy, public opinion is overwhelmingly against the conservative position:

- By 70 to 24 percent, a majority favors "keeping Social Security benefits as they are now, even if it means having to raise Social Security taxes." This is virtually identical to the 71-to-26 percent majority

The Harris Survey

that felt that way in February.

- By 85 to 10 percent, a majority supports "strict enforcement of air and water pollution controls as now required by the Clean Air and Clean Water acts," up from the 83-to-14 percent majority that felt that way in February.

The response of Americans to questions about these important issues casts serious doubt on the basic claim of conservatives that America has moved to the right in the 1980s.

Conservatives, however, argue that their supporters, admittedly a minority on these issues, feel so intensely about their views that they can be expected to bring more voters to the polls than their less organized opposition.

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National Journal

Challenge at EPA
The Democratic Field

THE WEEKLY ON POLITICS AND GOVERNMENT

MARCH 26, 1983 / NO. 13



Up for Grabs
Cruise Missile Contracts

OPINION OUTLOOK

The Environment: The Public Wants More Protection, Not Less

BY WILLIAM SCHNEIDER

At his March 11 press conference, President Reagan argued that the attacks on the Environmental Protection Agency (EPA) and on his Administration's environmental record were politically motivated. "I don't think that the people who were attacking [EPA administrator Anne] McGill Burford were concerned about the environment," he said. "I don't think they were concerned about any possible wrongdoing. As a matter of fact, I think this Administration and its policies were their target." When asked whether his past references to environmental extremists had contributed to the problem, Reagan replied, "Well, there is environmental extremism. I don't think they'll be happy until the White House looks like a bird's nest."

The President might be surprised to find out how widespread "environmental extremism" is. At the end of 1981, the Democratic National Committee (DNC) sponsored a survey in which respondents were asked to locate their views along a seven-point scale on which (1) meant "environmental regulations for air and water pollution should be strengthened" and (7) meant "environmental regulations for air and water pollution should be relaxed." No fewer than 40 per cent placed themselves at position (1), the most extreme pro-environmental position. Altogether, two-thirds of the public took positions favoring stronger environmental regulations, while only 18 per cent took positions toward the other end of the scale; 15 per cent said they were in the middle.

In early 1980, the Roper Organization Inc. and Cantlil Research Inc. administered a survey on behalf of Resources for the Future Inc. and found that 62 per cent of its respondents described themselves as either sympathetic to (55 per

cent) or active participants in (7 per cent) the environmental movement. Seventy-three per cent said the label "environmentalist" applied to them either definitely (18 per cent) or "in part" (55 per cent). Only one in four rejected the label.

A Louis Harris and Associates Inc. survey taken last fall revealed that one family in nine includes a member of a conservation, wildlife or environmental organization, and one family in four has contributed money to such a group.

A poll taken between July and September 1982 by Research and Forecasts Inc. for Continental Group Inc. found widespread endorsement of basic environmentalist arguments: "The earth is like a spaceship with only limited room and resources" (76 per cent agreed); "We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for ourselves" (79 per cent); "I feel that American beliefs and values have been a basic cause of our present environmental problems" (72 per cent).

But environmentalism, although virtually a consensual value in American society, is not an issue of great significance to most Americans. When polls ask people to name the most important problems facing the country, the environment usually ends up far down on the list.

The 1981 DNC survey presented respondents with a list of 26 issues and asked them to select the three or four that they thought were the most important ones facing the country. "Protecting the environment" came out 12th on the list with 15 per cent, substantially below reducing unemployment (33 per cent), protecting social security (26 per cent), keeping world peace (25 per cent), and reducing crime (23 per cent). "Cleaning up chemical toxic waste dumps" ended up in 24th place, with 5 per cent, while "improving the quality and supply of water," at 3 per cent, was at the very bottom of the list.

When the issues were grouped by topic, the three environmental issues, with a total of 23 per cent concern, were considered the least important. By comparison, 96 per cent were concerned with economic issues, 55 per cent with social welfare problems, 54 per cent with foreign policy and defense, 47 per cent with social issues (welfare, crime, family), 44 per cent with controlling government spending and regulation and 27 per cent with energy.

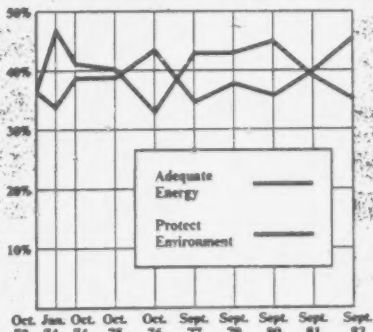
The evidence suggests that public concern over the environment increased rapidly during the later 1960s and reached a peak in 1970. Thus when the Gallup poll asked people to select national priorities in 1965, reducing pollution stood at 17 per cent. It shot up to 53 per cent in 1970 in a poll taken just after Earth Day. By 1980, concern over pollution had settled back to 24 per cent.

The rule for the environment seems to be: high consensus but low salience. (In the 1982 Continental Group survey, respondents agreed, 64 to 35 per cent, that pollution did not really affect their lives.) How, then, can one explain a striking feature of several recent polls on the environment—a marked shift of public opinion in a pro-environmental direction since 1980?

The chart on this page shows the trend on a Roper question asking people to choose between adequate energy and environmental protection. Concern over adequate energy was very high in January 1974, just after the Arab oil embargo. It declined in favor of the environment between 1974 and 1976 before rising again between 1976 and 1980, particularly after the gasoline crisis of 1979. But most recently, in September

The Energy-Environment Tradeoff

Are you on the side of adequate energy or more on the side of protecting the environment?



SOURCE: The Roper Organization Inc.

TRENDS AFFECTING GOVERNMENT POLICY

1982, the environment once again became the predominant concern. Indeed, at 46 per cent, the 1982 data showed the highest level of environmental concern for the past 10 years.

Harris surveys reveal a considerable increase since 1981 in support for strengthening the Clean Air and Clean Water Acts. Support for a stricter Clean Air Act rose from 29 per cent in September 1981 to 47 per cent in January 1983. Support for a stricter Clean Water Act rose from 52 to 61 per cent over the same period. Sentiment for relaxing automobile pollution standards has fallen from 38 to 26 per cent, while acceptance of lower pollution standards that would allow power plants to burn higher-sulfur oil and coal has dropped from 29 to 19 per cent.

Perhaps the most dramatic turnaround has been on a question asking people to choose one of three positions:

"(1) We must relax environmental standards in order to achieve economic growth.

"(2) We can achieve our current goals of environmental protection and economic growth at the same time.

"(3) We must accept a slower rate of economic growth in order to protect the environment."

The question was asked in 1978 and 1980 by Roper and Cantil on behalf of Resources for the Future; by the Opinion Research Corp. in 1981 (which used the wording "business and new job growth" instead of "economic growth"); and by Research and Forecasts for Continental Group in 1982. The proportion in favor of relaxing environmental standards to achieve growth was always low—20 per cent in 1978 and 1980, 22 per cent in 1981, 24 per cent in 1982. Between 1978 and 1981, the view that we should accept a slower growth rate to protect the environment diminished sharply, from 58 to 15 per cent. What increased was the middle view, that we can achieve both objectives at the same time, from 18 per cent in 1978 to 59 per cent in 1981.

The 1982 survey indicates a sudden reversal. As of last September, 49 per cent of the public was willing to accept a slower economic growth rate to protect the environment, while only 24 per cent took the view that we can achieve both goals at the same time.

The West is Green

During the widely publicized "sagebrush rebellion" of the late 1970s, many western politicians—most notably James G. Watt—argued that westerners opposed federal regulation of land use and federal environmental controls. Does this regional difference show up in public opinion?

According to a poll taken in July to September 1982 by Research and Forecasts Inc. for Continental Group Inc., residents of the Rocky Mountain states showed the strongest support for "resource preservation" of any region of the country.

A January 1983 Louis Harris and Associates Inc. survey for *Business Week* reported that "westerners consistently are less sympathetic than other Americans to proposed relaxation of various environmental statutes."

In a February 1983 survey taken by ABC News and *The Washington Post*, 28 per cent of the public said they disapproved of President Reagan's appointment and support of Watt as Interior Secretary, while 9 per cent approved (63 per cent had no opinion). Westerners, however, disapproved of Reagan's support for Watt by 41 to 11 per cent.

Note that the public never favored growth over environmental protection. What they favored increasingly was a balanced policy—until a few months ago, when concern for the environment upset the balance and became paramount.

The 1982 Continental Group survey also interviewed a sample of corporate executives. The prevailing sentiment among executives was not anti-environmental (31 per cent) but in favor of a balance between economic growth and environmental protection (49 per cent).

In an article in *Public Opinion* in early 1982, political scientist Everett C. Ladd argued that "trade-off questions" that force people to choose between environmental protection and economic growth do not pose the issue as most people see it. "An abundance of survey data shows beyond any shade of doubt that Americans want the environment protected and they want to achieve other material objectives like an adequate energy supply and economic growth," he wrote. "There is not one iota of evidence suggesting that the public thinks it must choose between the two." Why, then, has the public in recent months shifted away from its preference for a balanced policy and asserted a clear priority for environmental needs?

The reason seems to be that the Administration does pose the issue as a trade-off—a choice between economic growth and "environmental extremism." This is not necessarily to say that the Administration is anti-environment. Reagan strenuously denied such a charge at his press conference: "No one has given any evidence that that is true. . . . In eight years as governor, California not only led every state in the union, we led the federal government in environmental protection. We were the forerunners of the whole movement." But the Administration is deeply anti-government, and its reluctance to use the power of government to enforce anti-pollution standards is apparently seen as a threat to the public's pro-environmental consensus.

Thus in a Harris survey taken at the beginning of January, the public, by 47 to 34 per cent, believed the accusation that EPA administrator Burford, who has since resigned, "has failed to press charges against known violators of anti-pollution standards." By 52 to 36 per cent, they accepted the charge that Interior Secretary James G. Watt "has opened up national wilderness land to mineral and oil exploration, when the law says the wilderness is supposed to be preserved." (See box, this page.) In February, at the height of the EPA controversy, *The Washington Post*-ABC News poll found that by 60 to 16 per cent, the public felt that Burford cared more about protecting firms that violate anti-pollution laws than about enforcing such laws. Even more damaging was the finding that by 54 to 27 per cent, the public believed Reagan felt the same way.

The result is that the Democrats have acquired a decisive advantage as the party more committed to environmental protection. The 1981 DNC survey asked respondents where they would place the two major parties on the 1-to-7 scale of support for environmental regulation. By 60 to 14 per cent, the electorate saw the Democratic Party as favorable to strengthening environmental regulations—the same side as the public took. By 53 to 26 per cent, the Republican Party was identified as in favor of relaxing environmental regulations.

When asked by the Harris survey last August whether a Republican or a Democratic-controlled Congress would do a better job of protecting the environment, the public preferred the Democrats by a decisive 57 to 25 per cent. That was the strongest Democratic advantage on any issue except helping the unemployed, the elderly and the poor.

Dr. CUTLER. There's one dimension of this issue that hasn't been talked about so far today, and that is the opportunity to de-centralize this concern and this responsibility to the States and local government.

Section 9 of your bill does permit grants to States, local governments, individuals, and I would like to encourage attention to that because, for example, it is clear that the statutory or constitutional responsibility for the protection and management of resident wildlife species lies with the States, and it is important that the State fish and wildlife agencies, though they have been focused on single game species in the past, be encouraged to take a comprehensive look at the entire fish and wildlife resource, including all the game species in their own States.

The grants made to States: I would like to encourage the language in the bill to stipulate that the official State wildlife agencies as well as the State natural heritage inventory entities be eligible for these grants, to encourage States to move in the direction of biological diversity as the Federal agencies do.

The opportunities for individuals to contribute to that include the State income tax check-offs, where people can voluntarily give part of their tax refund to the non-game programs in their States, but that needs to be supplemented with Federal funds.

Just as we have built up the State land grant university systems, the extension systems, the experiment station systems, the Renewable Resource Extension Act provides money for wildlife extension work, I think we ought to move money from the Federal Government to States as a carrot to get the State wildlife agencies to move away from a single species/games species orientation to a concern for biological diversity in each of their States.

Mr. SCHEUER. Dr. Campbell, you identify several severe shortcomings in the efforts of the Federal agencies to conserve biological diversity and you suggested that a shifting of priorities in the agency budgets is necessary to conserve biological diversity.

In your opinion, would a congressional declaration of the importance of biological diversity be adequate to cause the agencies to shift their budgetary priorities, or is it going to take a requirement in legislation—a legislative mandate—directing them to prepare a Federal biological diversity strategy? Can we rely on a simple joint resolution of the two Houses of Congress, urging them to shift their priorities as expressed in their budgets or is it going to take a legislative mandate to do it?

Dr. CAMPBELL. Well, Mr. Chairman, I don't think a simple statement, joint resolution would do the job. As I said earlier, I think the most solid approach would be legislation that had enough teeth in it that they would have to pay attention.

In conjunction with that and in substitution for it, if you cannot pass the legislation in a timely way, would be much more frequent and direct oversight. The kinds of grilling you were giving the BLM this morning will have a beneficial effect on those agencies.

If they find out that Members of Congress are going to give them a hard time on a regular basis until they have something to show and not just rhetoric, then I think it will change.

It would be helpful, Congresswoman Schneider, if the committees with most direct jurisdiction over some of the agencies would carry

this out as well. The Fish and Wildlife Service has not been here today and has not been criticized in public for its role, but it is sad to see them—I think in many ways the land-owning agencies, even the BLM, are going more in the right direction right now than Fish and Wildlife Service is. Frank Dunkle seems to feel if it doesn't quack, it doesn't count.

I think it would be useful if the Merchant Marine Committee would bring him up short on that matter.

Miss SCHNEIDER. Well, this committee will be talking to the Fish and Wildlife Service at a later date and the Merchant Marine and Fisheries Committee—

Mr. SCHUER. The Fish and Wildlife will be testifying on the 30th.

Miss. SCHNEIDER. Oh, OK, the 30th.

The Merchant Marine and Fisheries Committee—this bill must be referred there anyway, but in addition to that as the ranking member on the investigations and oversight committee for Merchant Marine and Fisheries, we are going to be looking at sites in the next couple of weeks, so that is just a little advance announcement for any of you who would like to help in that investigation. Thank you.

Mr. SCHEUER. Yes, Dr. Plotkin.

Dr. PLOTKIN. One quick note on the subject of Congressional suggestions. AID has been pushed, pulled, shoved and threatened into supporting biodiversity projects in some of their foreign missions, and that has in fact been very successful and very beneficial, so we are talking about a case where encouragement from the Congress has had a very strong and very effective effect without necessarily involving new expenditures.

Mr. SCHEUER. That's very interesting. As a matter of fact, we had a hearing a couple of years ago—good things can happen. Good things can happen, even in the most unlikely circumstances.

We had a hearing a couple of years ago with several very competent professional Brazilian environmentalists who were criticizing rather bitterly a World Bank project to clear a large piece of land for resettlement, and they indicated the failure of these kinds of projects in the past, indicating that they had been unsuccessful in growing cash crops that they had tried to do, that this land was really incapable of sustaining the kind of settlements they had hoped to sustain, but they were irremediably wrecking the existing biological flora and fauna and animal life, and so we took that hearing record and we wrote a strong letter of about five pages single spaced and we sent it to the Secretary of the Treasury, who is the U.S. representative on the World Bank Board of Directors, and would you believe it that within approximately 3 or 4 months, the World Bank had cut that project off at the knees? They just stopped it because the local government officials in Brazil and the private groups had been flagrantly violating even the feeble World Bank environmental standards at that time. The standards are much stronger now, but with this little prodding from this little committee, probably two or three members showing up at a hearing, just as you had today, by golly our Government took action and our Board member even under this administration acted on our letter—and lo, and behold, the project got stopped; so occasionally, we can win one.

Yes, Dr. Cutler.

Dr. CUTLER. Another way to go about a practiced approach to improving the quality of information, the data that's available to these federal agency administrators, it seems to me, would be heart-to-heart back to the Global 2000 report that was done at the conclusion of the Carter administration by Jerry Barney and some others.

As you'll recall, one of the footnotes in that report was the difficulty in compiling and comparing information from Federal agency to agency because every agency has a different database, different computer system and different way to collect, analyze and report information. Dr. Barney's available, I'm sure. He has an office in Rosslyn, World Resources—I forget the name of the nonprofit he heads now.

If we could look at the opportunities as were recommended at that time, to bring all Federal agencies' computerized database systems into some degree of compatibility; then we begin to take a step toward the opportunity to have a national Federal Government-wide database on biological diversity.

Mr. SCHEUER. That's exactly what the National Center for Biological Diversity would be designed to do. Yes, Mr. Flamm.

Mr. FLAMM. I'd just like to make another comment and return to points that were made before, regarding the Forest Service. I feel this legislation you're proposing is very much needed and teeth in the legislation are needed. I've been associated for almost 30 years—

Mr. SCHEUER. We need more teeth than we have in it now?

Mr. FLAMM. Yes, sir.

Mr. SCHEUER. All right, be specific and give us concrete suggestions.

Mr. FLAMM. Yes, I have in the testimony. The teeth I suggested were one, mandatory program review by the agencies, mandatory compliance with the provisions of the bill and an escape clause for national defense. And that with due justification oversight on the EIS process by the EPA and oversight with much strength CEQ and the ability of CEQ to stop projects—at least delay projects while the President made his review.

The Forest Service, in spite of some changes, is still very oriented toward the timber program and commercial development. Conservationists hoped that after the passage of the National Forest Management Act in 1976, that this act would make a difference. So far, it hasn't made a difference. It will take a clear, strong, mandate and policy changes at the leadership level to probably accomplish the goals we want.

It's fine, in spite of the rhetoric, the Forest Service pursues policies primarily of development and timber exploitation with only a very minor attention to how these activities affect diversity. Certainly, they're in favor of expanded wildlife programs. They have some good people and good biologists and good scientists. The thrust of the program and the reason the Chief was defensive—this not only represents, of course, the administration's position, but that represents his concerns.

He feels that anything that delays his programs and that's mostly a timber sale program, is not good. He sees increased litiga-

tion. The litigation he talked about is much exaggerated. At any rate, the problem with appeals and litigation—the Forest Service is making decisions that the public doesn't want.

They don't want, as he said, more layers to interfere with what they're doing and somebody, the Congress, needs to interfere with what they're doing.

Mr. SCHEUER. Dr. Cutler, the endangered species listing progress has become extremely slow and frankly, based on politics as much as science. Do you see any way that the National Center for Biological Diversity could speed up the process of endangered species listing and perhaps even depoliticize that process?

Dr. CUTLER. Additional dollars for the Fish and Wildlife Service is earmarked for what used to be called the Office of Endangered Species which this administration has abolished; for that work in the Fish and Wildlife Service it would help. Certainly, a consensus from an external body such as the Center you recommend, Mr. Chairman, would be an additional source of action on the part of the Fish and Wildlife Service.

The Fish and Wildlife Service, as Dr. Campbell mentioned, is falling short of the mark in many respects. It's treating the national wildlife refuge system, not only as a duck factory, but as a place to install oil and gas development, far too much domestic livestock grazing, far too much offroad vehicle activity and giving endangered species listing and recovery, far too low a priority.

Just how you reverse that in the absence of support from the administration, from the Secretary, from the Assistant Secretary, from the Director, is a tough call. It probably has to do both with earmarked appropriations for Endangered Species Act work and to the extent it's possible, citizens' suits to sue the Agency to get it on the ball, to the extent there's opportunity to do that and put its feet to the fire.

Mr. SCHEUER. Now I'd like to ask all of you if there are any further reactions you'd like to give, in this sort of stream of consciousness that we're engaged in, on the testimony that you've heard today from the three agencies. Yes, Dr. Campbell.

Dr. CAMPBELL. There's been a lot of talk today about the inadequacy of knowledge and the inadequacies of the databases that the federal agencies have. They certainly are inadequate internally in that the kinds of surveys and reviews they've been doing have not been aimed at looking at biological diversity.

There's a good deal of information out there; much of it resulting from the work of the Nature Conservancy and the State Heritage Programs and a lot of the States also have their own natural area programs which are slightly separate. The States—many of them, are far, far ahead of the Federal Government in this area.

I think it's important as we proceed here—and I know your bill does—to integrate all of these things, to use the existing programs, to not duplicate or to require specifically, say, that the BLM build up its own database. There's no reason for BLM to build up a database in those states where someone else has already got the job two thirds or three quarters done.

They do need to contract for the use of that database to use it and then to take it seriously and act on the information. Again, I'm not certain what legislative language one would use to make

that happen. There's a lot more that they could be doing with existing sources, with minimal amounts of money. BLM, particularly, is very short of staff in the wildlife area and just doesn't have the people out there.

Mr. SCHEUER. They don't seem to be doing much with the professional recommendations that they do get from their staff, where staff does want to move. They've been sitting on a simple five-page report and don't even plan to meet on it until August of this year—11 months after it was delivered to the top BLM management.

Dr. CAMPBELL. They're quite vulnerable on that score. As I understand, one of their excuses, which they were too tied in by the Office of Management and Budget to tell you, is they don't have the staff. They don't have adequate money and adequate staff.

Mr. SCHEUER. I should have asked them that question.

Dr. CAMPBELL. They will duck and dodge; they are very good at it.

Mr. SCHEUER. They will what?

Ms. CAMPBELL. They will duck and dodge. They will not answer.

Mr. SCHEUER. I'm going to ask unanimous consent that the hearing record be kept open for another two weeks and that we be empowered to ask questions of all of the witnesses in both panels. There being no objection, so ordered.

Please continue, Dr. Campbell.

Dr. CAMPBELL. I'm just saying that your bill recognizes these other sources of data. I know there's another day of hearings coming up at which this will be discussed, but the agencies should not be allowed to continue to use that as an excuse. In many cases, as I cited in my testimony with the situation with ACECs in Colorado, there are agencies ready, able and willing to say where the biologically important acres are on public lands, but the Agencies don't want to hear it, because it gets in the way of the commodity programs and they don't want to cause conflicts.

Mr. SCHEUER. Oil, gas, timber?

Dr. CAMPBELL. I would say grazing and timber are most important. Oil, gas and mining also, but grazing and timber are the two predominant uses. In many cases, we're talking about fairly small areas, but it is going to get in the way of this particular grazing allotment where these particular ranchers run a few cattle, if you're really going to protect that area and the agencies don't want to do it.

To some extent, they need more money and more staff so that they will have the biologists on the ground to implement a program, but to a large extent it's a matter of political will and that's up to congressional oversight, I think.

Mr. SCHEUER. Anybody else have any reaction to the testimony you heard from the first panel? Mr. Pissot.

Mr. Pissot. Mr. Chairman, in response to that question and perhaps to follow up on Dr. Cutler's earlier remarks on the Endangered Species Act, the question might be asked, why do we have such slow progress on recovery? Why do we have so many candidate species waiting to be listed?

It might be rephrased in the form of, why is the endangered species program unnecessarily political? Why does the Fish and Wild-

life Service feel compelled to issue no jeopardy opinions? Why is the Forest Service reluctant to protect spotted owl habitats?

Mr. SCHEUER. No jeopardy opinions in what kind of a circumstance?

Mr. PISSOT. I believe the situation in Colorado, which was referred to in my testimony, regards a large dam project to supply water and about 10 threatened and endangered species that are affected by that project. There are other news clippings in my testimony that refer to a number of other similar opinions by the Fish and Wildlife Service.

I think that that situation, that problem, could be remedied by provisions in your bill. That is, the provisions that make protection a practice and early stage of biological conservation and protection, rather than wait until the crisis situation of endangerment, which you mentioned earlier.

I think the provisions of the bill combined with the amendments passed by the House in the Endangered Species Act which require monitoring of candidate species, would go a long ways toward depoliticizing the biological mission of preserving threatened and endangered species.

Finally, the element that I mentioned earlier in my testimony: that of public education. The public responds to the perceived battle between development projects and the protection of threatened and endangered species. I think an aggressive education program within the agencies would apprise the public of tradeoffs of the kinds of values that Dr. Plotkin talked about earlier this morning.

The role of threatened and endangered species, the role of biological diversity in our industry, medicine and agriculture, would go a long ways toward depoliticizing the crises that are frequently involved in trying to recover and save threatened and endangered species.

The emphasis with this bill, the amendments passed with respect to the Endangered Species Act, I think will give the agencies additional flexibility and open up lower cost options earlier in the game toward preserving endangered species and protecting the diversity that we're attempting to protect now.

Mr. SCHEUER. Are you suggesting that we move from a late intervention on the theory of 11½ hours intervention when the endangerment of the species has really gone on apace? When we substitute that for early intervention on a preventive health basis, before the species is seriously endangered, you're suggesting that that's a more cost effective approach?

Mr. PISSOT. Absolutely sir.

Mr. SCHEUER. Elaborate on that for us.

Mr. PISSOT. Well, I guess it's like the shot at the buzzer. There's a lot of pressure and not many options when you've only got a second left in the game. If you can exercise a variety of options, draw a number of parties who are affected by a decision in early in the game, then the creativity and the options that might be available, will provide for a solution that in many cases will be lower cost and have the support of those broad publics that are involved with the decision—or involved with the project or the saving of the threatened or endangered species.

Mr. SCHEUER. Anybody else want to elaborate on that? Let me hear any more reactions any of you might have to the testimony heard from the first panel. Mr. Flamm.

Mr. FLAMM. Just a point on a the discussion on coordination. Chief Robertson used the Yellowstone Committee as an example of coordination at work. I'd like to point out that even though the BLM and Fish and Wildlife Service have important management responsibilities in the greater Yellowstone ecosystem, they are not included in this coordinating arrangement.

Also, the coordinating and range—

Mr. SCHEUER. The Bureau of Land Management is not included?

Mr. FLAMM. The Bureau of Land Management is not included and there are three very important wildlife refuges included in the ecosystem and the Fish and Wildlife Service is not included in the agreement.

Mr. SCHEUER. Does BLM control land down there?

Mr. FLAMM. Yes, it does.

Mr. SCHEUER. Adjacent to or near?

Mr. FLAMM. It's within the ecosystem. It's scattered throughout the ecosystem. There's not one big tract of land. However; the elk refuge is extremely important in the ecosystem, managed by the Fish and Wildlife Service.

I think so far from what I can see, the coordination between the Park Service and the Forest Service is one, you keep out of my business and I'll keep out of yours. It's not coordination to benefit biological diversity. In fact, they're only coordinating on rather minor issues and they've promised not to get into the—they've put it this way: we recognize a different legislative mandate, so we're not going to interfere with your problem.

In part, I think the Forest Service is co-opting the Park Service from being critical of the timbering and roading program adjacent to Yellowstone which they very well know is having serious effects on that ecosystem.

Mr. SCHEUER. Instead of having overall concern for the environment and for preservation of biological diversity, which might impel them once in a while to blow the whistle on a sister Agency and haul them up to some kind of responsibility, they just look the other way. They ignore serious offenses against biological diversity.

Mr. FLAMM. That is what's happening. I'm sure the local park superintendent people there do not like that situation, but I think they've been forced into it. They've been quieted.

Mr. SCHEUER. It would make an interesting hearing, would it not, to hear from some of those park superintendents?

Mr. FLAMM. It certainly would. Especially if you could get them to say what's really on their minds.

Mr. SCHEUER. Interesting. Were you about to say something, Dr. Campbell.

Dr. CAMPBELL. I would just say that this is true even in cases where they have a legal responsibility to criticize the other Agency. The Fish and Wildlife Service endangered species biologists have been told that they will not issue jeopardy opinions criticizing a quote, "Sister Agency," whatever that means.

It certainly includes all agencies in the Department of the Interior and it might include all Federal agencies if one goes broadly

enough, which of course, then ends any point to having section VII at all.

Mr. SCHEUER. Let me ask all of you another question. We don't have a section in this bill on an international outreach. There are various reasons for that. At some time in the future, perhaps some kind of an international outreach program ought to be cranked into the legislative process. We're not sure how or when.

After all, the United States is supposed to be in the vanguard and let's say that due to miraculous events possible in the next 6 months, we had leadership in Washington that really wanted to remediate the damage here and reestablish us as a first in global environmental activities and in leadership in biological diversity.

After all, Theodore Roosevelt was one of the first great environmentalists and he was a member of that other party. All things are possible. If that were to happen and we got an administration of either party that really was committed to the goals that we've been talking about, how would you structure some kind of outreach capability that would enable us to bring along other countries in the world, particularly the undeveloped countries who have less infrastructure and less professional know-how, perhaps than we do?

Yes, Dr. Plotkin.

Dr. PLOTKIN. If I just might be heard on that, I think that jawboning might be one of the most effective ways, if every ambassador from this country goes there and starts talking about conservation, it makes a difference. I had a meeting with the Minister of Waters and Forest in Madagascar along with my colleague Dr. Russ Mittermeier of the World Wildlife Fund, vice president for Science and he said, you know, I've just talked to the President of Madagascar and he was shaking his head.

He's just had a meeting with the American ambassador and he said, she wasn't interested in the fact that Madagascar was strategically located. She wasn't interested in the fact that Madagascar didn't produce enough rice to feed her people. She was interested in lemurs and baobab trees and this had a major effect on the fellow and once again, we're not talking about additional expenditures, just the fact that the American ambassador said, this is important and this is a leading role for you on the global scene.

This is, in fact, shown up in the Economist this week, on Madagascar's importance for its biological diversity. I think this is just one method that we can use. It doesn't cost anything. Another thing is workshops which Fish and Wildlife has been active in, both in this country and in the developing countries to share expertise.

Once again, we're talking about the cost of several plane tickets. We're not talking about major expenditures to start new programs. But just putting our own ducks in a row and helping out in these countries with lip service and small funding when necessary and finally, on the subject of the multilaterals. When Congress talks, the World Bank listens, as you so eloquently demonstrated.

More pressure on the World Bank to put environmental safeguards in their loans and to provide monies above the loans as grants to make things happen on the ground.

Mr. SCHEUER. I'm under the impression that the World Bank is doing more of that today than they were doing a few years ago.

Dr. PLOTKIN. The World Bank is doing a lot more on that but as we see in the case of several other situations, trickle down effect doesn't always reach the bottom levels and Mr. Conable has certainly made the right noises, but I'm not convinced that all the economists in the bank are totally committed to the cause of conservation as part of economic development.

More pressure needs to be put on and remember that the World Bank operates as a lending institution and in many cases, governments of countries like Madagascar or Mexico or Brazil cannot afford to borrow money for conservation issues and their need is for direct grants as seed money to get the ball rolling.

Mr. SCHEUER. That's similar to the situation with regard to population programs, family planning programs. They may be interested in doing something and countries like Mexico and Brazil have done a complete about face on the matter of family planning. They used to be very pronatalist and now they're antinatalist and they want to contain their population growth. But they don't want to borrow to do it.

Dr. PLOTKIN. Exactly.

Mr. SCHEUER. That's a big problem. The World Bank is trying to figure out ways to help them with very soft loans at very low negligible interest rates. But the economists in these countries can't equate a significant reduction in their population with all of those intended advantages, with any identifiable cash flow with which they would pay debt service on a loan.

Dr. PLOTKIN. Well, there are those who argue that more population growth is good because the more people there are, the more problems that get solved, but I always ask them, how many future Beethovens are going to come out of the slums of Haiti?

Mr. SCHEUER. There are very, very few. I mean, the group of people who say that are themselves an endangered species.

Dr. PLOTKIN. Fortunately.

Mr. SCHEUER. Fortunately. Very few credible professionals are saying that anymore. There are too many Haitis around the world as object lessons for the contrary point of view. Yes. We'll go right across the line. Dr. Campbell.

Dr. CAMPBELL. Thank you. In contrast to Mark's suggestion of things that don't cost money, I have a suggestion for something that does cost, but it doesn't cost very much. Both the Fish and Wildlife Service and the Park Service have small international affairs offices, that are now offering their help in developing infrastructures and technical expertise.

Both of them are——

Mr. SCHEUER. Does the Bureau of Land Management have that?

Dr. CAMPBELL. No. But I'm not sure I want them to at this point.

Mr. SCHEUER. No. But maybe with a little revised leadership——

Dr. CAMPBELL. Forest Service does in connection with AID.

Mr. SCHEUER. Yeah.

Dr. CAMPBELL. Actually, I think there are good people in the Bureau who would have much to offer on dry land management, but anyway, both the Park Service and the Fish and Wildlife Service are pretty much limited to the western hemisphere right now because that is the funding that they have managed to get and in

fact, the Park Service never asks for that funding. It's a congressional add-on year after year.

There is much good work that they could be doing in Asia and Africa if they had a couple of hundred thousand dollars to do it.

Mr. SCHEUER. That's not a heck of a lot of money.

Dr. CAMPBELL. No, it's not and I think there are people in the Park Service and Fish and Wildlife Service who have worked abroad. I mean we're not talking about folks who wouldn't know how to deal in Third World countries. Many were Peace Corps volunteers. They know what they're doing. They know the languages. They could really offer a lot and building up the technical expertise of the staff in those countries is not the only answer, but it's certainly part of the answer.

Ms. SCHNEIDER. I might add that this committee held some hearings last year and we learned that the Peace Corps did not have their own forester and that there are many gaps as you point out, in our foreign operations of AID, etcetera.

But I might also mention to all of our allies who are at this table that the foreign aid bill which includes two amendments that are of particular importance that were developed before this committee having to do with calling for building a sustainable development through appropriate technology transfer not only in terms of agricultural use but also in energy use, has passed as part of the foreign aid bill which is sitting now over in the Senate.

There was another provision that would earmark some AID monies for extension service programs to women, since women do 80 percent of all the agriculture in those countries and women are also responsible for cutting down all of the trees, so if you want to help us lobby—

Mr. SCHEUER. I don't want us to overlook the fact that they do 100 percent of the childbearing.

Ms. SCHNEIDER. This is true, regrettable, but true. So we could use your lobbying help in the Senate—

Mr. SCHEUER. I've always said that where you have an outreach to women who do raise 80 percent of the food, you ought to have a little outreach on family planning so that they can equate the number of mouths the plot of land that they're raising food on can sustain, can nourish, with the number of mouths that they are also producing. Okay. Now let's continue across the board here on this question of, what kind of a foreign outreach should be provided under legislation we're considering?

Mr. PISSOT. Thank you, Mr. Chairman. I will ask France Spivy-Weber who deals with international programs in our capital office to provide you with some additional information on this topic—

Mr. SCHEUER. Yes, if you could send us a memo in the next ten or twelve days, we would include that in the record.

Mr. PISSOT. All right, sir. Three quick answers come to mind. In our testimony, we have recommended that the Interagency Coordination Committee include U.S. AID, the Department of State and the Department of Treasury regarding their international roles. Second, it's been said that this country's greatest export is not material goods but is the U.S. Constitution and I think that by a piece of legislation that specifies that the conservation of biological diver-

sity is a national priority, we can take the lead and perhaps export that document as well.

My third recommendation is more specific and it perhaps opens a Pandora's box. As we've heard about the variety of plant and animal tissue that comes from outside the country and is used then officially by industry, medicine and agriculture in this country, I question what compensation returns to the countries which intentionally or accidentally have preserved and provided these plants.

Obviously, corporations and industry which bring those to this country realize a profit. This country realizes the profit through health, agriculture and industry on the individual basis, and I'm not sure what compensation is offered to the nations, the local people, or the political subdivisions that have provided us with those benefits.

[The information follows:]



National Audubon Society

NATIONAL CAPITAL OFFICE

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WASHINGTON, D.C. 20003

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29 June, 1988

Hon. James Scheuer, Chair
Subcommittee on National Resources, Agriculture
Research and Environment
Committee on Science, Space & Technology
U.S. House Of Representatives
Washington, D.C. 20515

Dear Mr. Congressman:

Thank you for your request to James H. Pissot, Wildlife Specialist for the National Audubon Society, that we submit additional comments concerning ideas for integrating international conservation of biological diversity into H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act.

Treaty expertise in domestic agencies

The United States government is a party to many treaties that address conservation of plants and animals in nature. While the State Department has formal authority for international treaties, U.S. government agencies with wildlife expertise often take the lead in establishing U.S. policy for these treaties. They also implement programs that are responsive to these multilateral agreements. As conservation of biological diversity becomes a national policy, increased funding should accrue to domestic agency programs associated with such treaties or United Nations agencies as those mentioned below:

- The Antarctic Treaty
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- International Convention for the Regulation of Whaling
- United Nations Education, Science & Cultural Organization's Man and the Biosphere Programme
- United Nations Environment Programme (UNEP)
- Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere
- Convention for the Protection of the World Cultural and Natural Heritage
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR)
- Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region
- Bilateral agreements with Canada, Mexico, Japan, and the USSR on migratory birds
- Bilateral agreements with USSR and China on the environment

Data Center cooperation

When a National Center for Biological Diversity and Environmental Research is established, it will be essential that data collected be compatible with existing international data collection centers such as the Conservation Monitoring Centre of the International Union for the Conservation of Nature and Natural Resources (IUCN), UNEP's GRID System, and the Conservation Data Centers in the Western Hemisphere.

USAID and Treasury representation on the Interagency Group

Congress has successfully influenced U.S. and multilateral development agencies to include conservation of biological diversity in their development programs. Any Federal Interagency group will benefit from the experience of USAID and the Department of the Treasury's World Bank advisors, where conservation of biological diversity has already been incorporated into their international programs.

Global Action Plan on Biological Diversity

Starting this month international and national organizations, scientists, governments, and nongovernmental and grassroots organizations are cooperating in the development of a global action plan on biological diversity. Attached is schematic plan for its development. It should be of use to you and your staff in shaping the legislation to respond on global biological diversity needs.

The National Audubon Society wholeheartedly supports H.R. 4335, and we look forward to giving this bill visibility and building support for its passage.

Sincerely,

Frances Spivy-Weber
Frances Spivy-Weber
Director, International Programs

cc: Kenton Miller, WRI

0338H

GLOBAL ACTION PLAN ON BIODIVERSITY

Project Description

Background: The case for the conservation of the great variety of Earth's life forms has been made convincingly by scholars and practitioners in science, resource management and conservation advocacy. The conservation of biodiversity is fundamental to basic human needs and ecological processes. The practical and ethical implications of continuing and expanding human intervention in the biosphere are causing concern among scientists, political leaders and the public.

As a result of human intervention, the planet is in the midst of the most massive episode of species extinction and habitat loss in some 65 million years. Urgent action is necessary to reverse the current trend and restore and maintain biodiversity. Because it is largely irreversible, the loss of biodiversity may be more significant than the interrelated impacts of global climate change and continued population growth as a factor seriously degrading the human condition and environment during the lifetime of the present generation.

However, action is already underway by a number of international organizations, scientists, governments and non-governmental and grassroots organizations around the world. Foundations, aid agencies and the multilateral banks are beginning to support these efforts.

Goals and Objectives: Needed is an overall framework providing an integrated perspective on the global effort required to pass on to the next generation the maximum possible variety of plants, animals and options for future resource use and development. This project will provide conceptual tools and techniques for actions integrating the array of available conservation methods, and integrating biological conservation with sustainable development strategies.

Program: The World Resources Institute, in partnership with the World Wildlife Fund, the International Union for Conservation of Nature, the United Nations Environment Program, and other governmental and non-governmental groups, will develop and implement an action plan on the conservation of biodiversity. It is expected that the multilateral banks, development aid agencies, and foundations will be interested in supporting implementation of the plan in association with local governmental and non-governmental organizations.

A fundamental tenet of the program is the recognition of the importance of integrating the conservation of biodiversity as a component of sustainable economic development. The ultimate success of the program will depend on local support of

conservation initiatives and on success in controlling the growing pressure on remaining unexploited resources through strategies of sustainable development.

The program will seek the direct participation of scientists, resource managers and non-governmental organizations with the aim of establishing a sound scientific base, practical methods for biodiversity conservation, and mechanisms for fostering grassroots action. Furthermore, an advisory group made up of representatives of these communities will guide the program.

Elements of the program will focus on: .

- global network of protected areas
- strategies for application of full range of in-situ and ex-situ conservation practices
- scientific basis of biodiversity
- capacity to manage biodiversity activities
- environmental restoration
- management of lands adjacent to reserves and regional development
- marine and coastal areas
- global climate change
- information and data management
- research agenda
- policy reform and economic incentives

Phase I: During the period May through December 1988 the project team will develop a white paper which will describe and analyze the problem and suggest a framework for action. This paper will be reviewed during a series of consultative meetings in Asia, Africa, Europe, Latin America and the USA. Participants will include outstanding scientists, resource managers and non-governmental/grassroots organizations. These reviews will provide the team with the input necessary to improve project documentation and to formulate the action plan in cooperation with appropriate partners. The Rockefeller Foundation has provided a grant of \$50,000 to support this initial work.

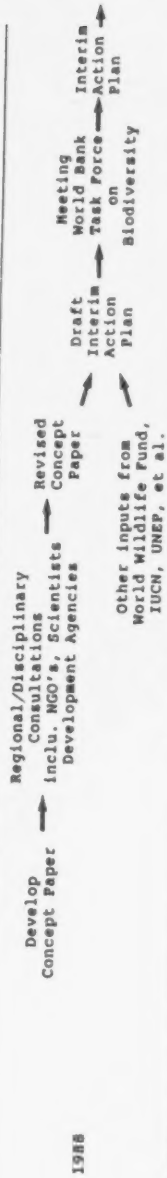
Phase II: It is expected that the action plan will be formulated during a two year period, 1989-1990, followed by an intensive period of implementation. Again, efforts will be made to involve the broadest possible participation.

For further information, please contact:

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Program Director,
Forests and Biodiversity
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(202) 638-6300

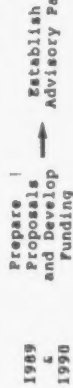
Russell Mittermeier
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Schematic Plan for the Development of
GLOBAL ACTION PLAN ON BIODIVERSITY
by
World Resources Institute, World Wildlife Fund, IUCN, UNEP, and partners
World Resources Institute
6/15/88
Draft

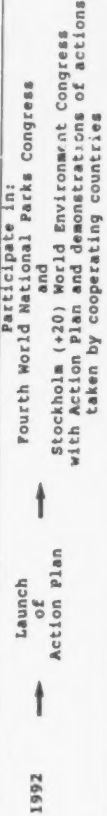


Biodiversity Studies

- Protected Areas Network
- Scientific Basis
- Integrated In Situ/Ex Situ Strategies
- Restoration Ecology
- Sustainable Development
- Marine and Coastal Areas
- Climate Change
- Policy Reform/Economic Incentives
- Information/Data Management
- Research
- Management Capacity
- Conservation Conventions
- International Cooperation



- Biodiversity Field Activities
- Consultation
 - Test and Implement Strategies and Demonstrations for Biodiversity Action



Mr. SCHEUER. Thank you. Yes. Dr. Cutler.

Dr. CUTLER. There's a bill pending before the Congress, the short-hand name of which is Debt for Nature. Debt. D-e-b-t. Debt.

Mr. SCHEUER. Oh, debt for nature.

Dr. CUTLER. It has to do with forgiving international debt to Third World Countries, if they will establish parks and natural reserves. There's a member from the Republican Party from the Chicago area—I can't remember——

Mr. SCHEUER. John Porter.

Dr. CUTLER. That's it. John Porter's bill. Perhaps that concept could be built into your legislation.

Mr. SCHEUER. Yes. It seems to me that if we decide we're really going to help these developing nations handle their debt and help them pick it up and subsidize the debt service payments for a period of years, the least we ought to do is to get a commitment from them that they will stop degrading the planet in terms of wildlife management and in terms of abolishing, destroying their tropical forest resources, in terms of biological diversity, in terms of eliminating the desertification and the deforestation that comes from wanton destruction of trees and forests.

Also, in terms of doing something about their population growth because it's population growth, uncontrolled population explosion, that causes them to have to clear more land for a settlement, causes them to have to intensely cultivate land that should not be intensely cultivated whereby they destroy a very fragile ecosystem.

Too many people, too many animals, grazing on too fragile an ecosystem. It seems to me that we have the right to ask them to engage in sound, sustainable practices in regards to the whole length and breadth of these matters that so affect their well-being and so affect the globe. There's no way they can contain the damage they are wreaking on their environment and on their biodiversity to their own countries. It seems to me they have an obligation not only to think of themselves and the future of their own people, but to joining us in thinking of the future of the planet.

Dr. Campbell?

Dr. CAMPBELL. Yes. I think when we work with them in that area, we must be very careful not to preach. We've already done that to the United States. We've decimated this country biologically, so I don't think we can preach to other people. I think we need to bring in all the new information that shows how horrible the results of loss of biological diversity are and try to persuade them to do it better than we did and to say we're trying to clean up our own act.

Mr. SCHEUER. What is the difference between the preaching that you're discussing and the jawboning that Dr. Plotkin was discussing?

Dr. CAMPBELL. Well, it's all semantics. It really is but I think that one has to begin by saying, we're paying for it in the United States. We've already caused considerable desertification. We've already decimated the original forests and now have something growing back in many cases which often is not what was there before.

We have put areas that shouldn't have been cultivated under intensive cultivation and now we have a farm bill that's trying to correct some of that. I think that there are positive ways that one

can take our own bad examples and go to others and say, see, now we're paying for it and we're trying to correct it.

Mr. SCHEUER. Actually, a lot of Third World chiefs of state will say either just exactly what you've said that you've been wrecking your land, your water, your air for the last hundred years and now you've gotten religion. Now you're asking us to pay for some very expensive programs.

Forgive us, but we'll take the price tag that you have paid. Just give us some of those smokey skies and polluted waters and so forth and give us the product of the industrialization, the addition to our per capita GNP. Just give us the product and we'll pay the price.

I've heard that from several——

Dr. CAMPBELL. Oh, I'm sure you have and I——

Mr. SCHEUER. Several developing world chiefs of state.

Dr. CAMPBELL. I'm not suggesting that we take that answer as the final answer. I'm just saying that we have to be a little humble ourselves because they're right.

Mr. SCHEUER. Well, it's true. We have a lot to be humble about. But all the same, I'm not sure if I know the difference between preaching and jawboning. It's a nuance, it's the way you do it whether you threw your arm around somebody's shoulder while you're whispering into his ear.

I notice that when Mr. Reagan tells—and he's an expert communicator, we all know that—when he draws Mr. Gorbachev's attention to the fact that they're in systematic violation of the diplomatic accords that they freely signed under the Helsinki Act—nobody had a pistol to any Russian signatory's head—they freely took on those obligations under the Helsinki Act, they're firm, legal obligations, but when Mr. Reagan points this out to Mr. Gorbachev as he has done several times to his very great credit, Mr. Gorbachev says, you're preaching. This is an internal matter in the Soviet Union and you should stop your preaching. [Laughter.]

So, a rose by any other name would smell as sweet. Does anybody else have anything to add? Yes, Mr. Flamm.

Mr. FLAMM. Well, as has just been pointed out. The problem's very large and I think to really deal with the international environmental problem's going to require a new kind of commitment by this nation and a new willingness to share. In terms of this——

Mr. SCHEUER. Well, I'm assuming that we may have that in the next—by the time 1989 rolls around—from whichever administration. I'm asking, assuming there's a new commitment, what are the systems and processes and outreach formulas that it might be well to include in such a bill as we're considering today?

Mr. FLAMM. I think number one, that the bill ought to clearly state that the policy applies and not only to our domestic programs and domestic actions, but also to our overseas, our foreign programs.

That the same kind of guidance that we would give to programs in this country, the kind of forest management we would like to see the Forest Service conduct, that seems standard, ought to guide our overseas programs.

To some extent, one, we're not satisfied with our own performance, number one. So it's somehow—it's naive to think that the

people we're not happy with in managing our national resources are giving solid advice to Third World countries on managing. So that's an area of concern that I think should be addressed and this is at the technical advice level. I think your idea of sort of a cross compliance—that our assistance that we do give and I think we should give more—but ought to be tied to some long-term conservation commitment on the part of the country and it seems like this could be part of your policy statement or objectives and don't—

Mr. SCHEUER. OK. We thank you very much. It's been an extremely informative hearing. You're very patient in wading almost through 4 hours of hearings and we're indebted to you. We're grateful for your excellent testimony. Thank you and the hearing is adjourned.

[Whereupon at 1:15 p.m. the subcommittee was recessed, to reconvene at the call of the Chair.]

THE NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND ENVIRONMENTAL RESEARCH ACT

THURSDAY, JUNE 30, 1988

HOUSE OF REPRESENTATIVES, COMMITTEE ON SCIENCE,
SPACE, AND TECHNOLOGY, SUBCOMMITTEE ON NATURAL
RESOURCES, AGRICULTURE RESEARCH AND ENVIRON-
MENT,

Washington, DC.

The subcommittee met, pursuant to notice, at 9:45 a.m., in room 2318, Rayburn House Office Building, Hon. James H. Scheuer (chairman) presiding.

Members present: Representatives Scheuer, Schneider, Henry, and Buechner.

Staff present. Michael Rodemeyer, staff director and counsel; Wesley Warren, Republican technical consultant; and Dr. David Blockstein AIBS/ASZ science fellow.

Mr. SCHEUER. The Subcommittee on Natural Resources, Agricultural Research and Environment will come to order. Today we'll have our second day of hearings on the National Biological Diversity Conservation and Environmental Research Act.

Our first hearing was several weeks ago, and it established the urgent need for a major effort to stem the loss of biological diversity. Many experts at that hearing testified as to the inaction of all federal agencies on the issue of biological diversity. We also heard of the special problems of Hawaii, an endangered American jewel of biological diversity where 90 percent of the species, both animal and plant, are unknown to the rest of the world outside of the confines of that beautiful island.

Today we'll take a closer look at the science needed to conserve and wisely use biological diversity. In order for conservation to be effective, of course, we need knowledge. Knowledge is power. We need to understand the elements of biological diversity—genetic material, species, and ecosystems. We need to know where these elements occur in the environment and we need to know what elements are most at risk, how they are currently protected and what more needs to be done about them.

We must also understand better the properties of their various biotic elements, the living elements, both animal and plant and how they relate to each other. Without this information, we are flying blind in our efforts to conserve biological diversity. That's a truly tall order. In the United States alone, we have hundreds of thousands of species of plants and animals. In the world we are

told there are somewhere between three million and thirty million and we don't know if the actual number is near the top of that range or the bottom of the range or in the middle. That's some indication of how much we need to enhance our knowledge of the biota.

Our understanding of biological diversity is inadequate for us to even know which of those two figures is more likely to be correct. The ecological communities are even harder to characterize. The system most commonly used by the federal agencies identifies 135 discrete types of vegetative communities in the United States. There are many attempts to understand and monitor biological diversity.

A 1980 report by the Council on Environmental Quality indicated that the federal government had at least 1,600 monitoring projects underway. On top of that, there are numerous projects conducted by state and local government, scientific research for museums, universities and other institutions as well as private efforts like those of the Nature Conservancy.

Despite this information, there are a lot of things we don't know but urgently need to know. For example, there is no complete listing of which ecological communities are protected by federal and state preserve systems. There is no single place that one can turn to for information on a single group of species such as sea turtles, for example.

Despite an emerging technology, there is no single geographical-based information system that describes the biological resources of a particular piece of land. This is the kind of information that we must have to be truly effective in conserving biological diversity. We must know what we have and where we have it in order to maintain it. That does seem like a truism.

The National Center for Biological Diversity which would be established by this legislation is intended to provide and organize the information we need to conserve biological diversity. The Center would establish a cooperative network of organizations that maintain data on biological diversity. The Center would review the existing information on biological diversity. The Center would coordinate and support an ongoing survey of the biota of the nation to be conducted by groups outside of the Center.

The Center would prepare lists of biological diversity—lists of the elements in our biological schema that are declining—that are in danger—or that are otherwise threatened or of special concern. The Center would provide information for the preparation of the federal strategy to conserve biological diversity.

This National Center will help us move from a fragmented, non-system of biological data to a coordinated network that would allow us to be pro-active in conserving biological diversity. We are privileged today to hear from an outstanding group of witnesses who are intimately involved in the effort to monitor and maintain biological diversity.

The panel involves federal, state, and private representatives. Each one—each sector, plays a key role. Our task today is to learn how we can help these groups to work together toward achieving our national goal of biological conservation. Before we begin, let me turn for a brief moment to the ranking member of this subcom-

mittee, Congresswoman Claudine Schneider of Rhode Island who is the leading co-sponsor of this bill and who has been a driving force in the effort to conserve biological diversity.

Miss SCHNEIDER. Thank you very much, Mr. Chairman. Let me say that during our hearing that we had already held back on June 9, there were several administration witnesses that came before us and they testified that they already possess the necessary authority to assess the impacts on biological diversity specifically through the NEPA process. Well, given this assurance, you can't help but ask, well if this is so, why has not more been done in the past? I think the answer turned out to be a general theme throughout that hearing which focused on the fact that the conservation of biodiversity was to a large degree a determination of political will.

Well, today this hearing will be considering a related but also separate question which is "What is the state of our knowledge and what are the research needs in the area of biodiversity?" We're going to be examining in particular the role of the National Center for Biological Diversity and Environmental Research in helping us protect our natural and valuable resources.

Today I believe we will discover that just as sure as a lack of political will is a weakness, the acquisition of greater knowledge is certainly a virtue. I think that what I in particular am interested in learning is some of the feedback from the witnesses as to why a National Center for Biological Diversity is so very important.

We have had bits and pieces of information come before us to say that it is estimated that over 20,000 species of plants and well over 300,000 organisms overall in the 48 contiguous states of the United States exist, but yet also that here in the United States there are new species of life that continue to be discovered.

Also, even in the United States, extinction may threaten hundreds of animals and thousands of plants, and yet a recent study by the Office of Technology Assessment had pointed out that the loss of biodiversity is often unintended. Well, if that is so, it also points out that it is avoidable. So what that means is that we just didn't know what we were doing in the early 1950s and 1960s when we were disposing of our hazardous wastes and other pollutants into our natural waters and into the air, et cetera, et cetera.

Also I think most agencies, including the Fish and Wildlife Service which will be testifying before us today, concentrate on gathering information on endangered species and very little is being done about a systematic catalogue of species before they become threatened with extinction. Furthermore, we are losing, I believe, our leadership in this field. At a time when the United States is attempting to encourage the maintenance of biological diversity in the Amazon and Madagascar and other countries throughout the world, I think that it's critical that we recognize that Japan, Australia, Europe, China and the Soviet Union are all moving ahead of us insofar as their own role in maintaining biological diversity.

Finally, insofar as the Center is concerned, it will not only collect data on the state of biological diversity but it will also provide information that will assess that information on conservation policies. The protection of our rare and valuable natural resources I believe is too important to be left to a perpetual game of environmental blind man's bluff. We have the opportunity today to hear

from our witnesses, many of whom have made the study of biological diversity a life-long career.

I look forward to the comments and the feedback that we will get in this hearing and Mr. Chairman, I commend you for your work in assisting this committee to expand our base of knowledge as to what we do need to do and what we do need to know insofar as maintaining all of those species here within our own country. Thank you.

Mr. SCHEUER. Thank you.

Congressman Paul Henry.

Mr. HENRY. Thank you, Mr. Chairman. I do not really have an opening comment but I do want to—since I missed the earlier committee meeting last week—express my deep admiration to yourself and Ms. Schneider for the leadership you've given and driving and forcing this issue on all of us. Thank you.

Mr. SCHEUER. Well, we didn't have to drive it onto you, Congressman Henry. You've been a very dedicated and active, a pro-active member of this committee and a leading sponsor of the legislation. Congressman Jack Buechner of Missouri.

Mr. BUECHNER. Thank you, Mr. Chairman. I am happy to be here today to join with you. As I join with you and the wonderful gentlewoman from my side of the aisle that is a major co-sponsor with you on this important piece of legislation, I'd like to welcome Dr. Peter Raven, a very good friend of mine, Mr. Richardson and Dr. Thomas Lovejoy and the other witnesses here today who are representing environmental perspective on biological diversity.

During this hearing it's my hope that many of us will in a renewed manner appreciate the fact that our world with all of its evolutionary and ecological benefits is in serious trouble, and that we must formulate long-term, large-scale plans for maintaining biological diversity, thus aiding the causes of both peace and prosperity in the future.

The on-going process of destroying our natural habitats is a folly our descendants are least likely to forgive. We can no longer justify forest destruction as a means of profit. The consequences will take millions of years to correct. Our national laws are the most effective tools for us to address the loss of biological diversity in the United States.

We must begin by preventing the need to use the term "endangered species," by going beyond the protection of those species whose habitats and ecosystems are on the brink of extinction. We as a nation need to make a strong commitment to maintain the diversity of life through recognition and appreciation of species and scientific exploration of living resources. These are the goals reflected in the National Biological Diversity Conservation and Environmental Research Act.

Biological diversity impacts us economically, ecologically, and morally. Biological resources provide medicinal supplies, food, shelter, and many other potentially valuable products. By establishing a national plan to conserve our biological diversity, the United States will set the stage for avoiding a global crisis as well.

This must become a priority on our national agenda in order to ensure sound environmental management and development, not

just for us but for the world. Thank you, Mr. Chairman for all the leadership that you've given us in important legislation.

Mr. SCHEUER. Thank you very much, Congressman Buechner. Thank you for your involvement, your leadership. For our opening witness we have the complete government servant. Elliot Richardson, since 1970, has served in such a large variety, a wide variety of Cabinet jobs it almost boggles the mind.

He is a one-man walking Cabinet. Starting in 1970 he was Secretary of HEW. He was then Secretary of Defense. He was then Attorney General. He was then Ambassador to the Court of Saint James. He then served as Chairman of our U.S. Delegation to the Law of the Sea Conference. I might have gotten the order of events mixed up but I haven't gotten the man mixed up.

He's one of the great public servants of our time and it's interesting to me that whenever truly important items crop up on our agenda like biological diversity that don't have mass appeal, that aren't sexy but are just simply overwhelmingly important, Elliot Richardson is just as likely as not to be the leader of the leaders.

So it's a great pleasure, Mr. Richardson, Ambassador Richardson, Secretary Richardson, to welcome you here today. Your full statement will be printed at this point in the record, so why don't you take such time as you may need, not to exceed ten minutes, of course, to chat with us informally as if we were in a living room together. Chat with us about the importance of the problem, what you think about the legislation and leave your imprint on the sands of time of the movement for biological diversity.

STATEMENT OF HON. ELLIOT RICHARDSON, ROGER TORY PETERSON INSTITUTE

Mr. RICHARDSON. Thank you very much, Mr. Chairman. I warmly appreciate those very generous words of welcome—a bit of hyperbole here and there perhaps, but nevertheless I am grateful. I am grateful for this opportunity as well.

The last time I appeared before you, Mr. Chairman, was, I think, quite a few years ago in one of those jobs you referred to. I was then Secretary of Commerce, but I was also at the time the Chairman of the Energy Resources Council and I came up here to testify on the disposition of low-level radioactive wastes. As I remember it, it was a plan that involved the encapsulation of such wastes in a binding glass matrix which would then be deposited at great depth in salt domes, and I can only say that I haven't heard of a better idea since.

In any case, I would like to congratulate you and your colleagues on the introduction of legislation that will make possible positive action to address the urgent concerns identified in the 1987 OTA report, "Technologies To Maintain Biological Diversity." The statements that you and your colleagues—and I particularly want to recognize the person I've long greatly admired, the ranking Republican, Miss Schneider, for her opening remarks today. These well set forth the importance of this legislation and I really have nothing to add or to contribute on that score. My concern with the subject matter is of long standing.

I had occasion in 1972 at the Smithsonian to give the opening address at the time of the publication of the report on "The Limits To Growth," and while I think it was in some respects a flawed study, it nevertheless did make a significant contribution to awakening public awareness of the systemic interrelationship of the flow from population growth, increased rates of consumption, depletion of nonrenewable resources, and of the environmental impacts that flow from these developments.

More recently I had the pleasure of serving on the board of the World Wildlife Fund where, under the leadership of Russell Train and Dr. Thomas Lovejoy—who will be testifying here later this morning—I began to appreciate with greater sensitivity the importance of biological diversity itself—the central concern of this legislation.

I later served on the Year 2000 Committee which grew out of the Report on the Year 2000 that was prepared in the last year of the Carter Administration. That report was significant in many ways in highlighting the interrelationships among all of the trends that had earlier been addressed in the Limits to Growth report. It was, I think, however, perhaps most significant to the extent that it pointed up the inadequacies in the data developed by the federal government for purposes of understanding these trends and the interaction among them.

The report highlighted both the gaps and the incompatibilities among these data. It also underscored the insufficiency of the priority being given to the development of the kinds of global models that can serve to warn us about the implications of long-term trends. It is, of course, Mr. Chairman and members of the subcommittee, a fallacy to suppose that such projections can be equated with predictions but they do tell us that on the basis of what we know there may be reason to be deeply concerned about potential implications of what we see.

The greenhouse effect is, of course, just that kind of a projected development which it behooves us to focus on now insofar as it may be possible to ameliorate or to reduce the results that will otherwise occur as a consequence of the uncontrolled accumulation of carbon dioxide in the atmosphere.

The problem more directly addressed by H.R. 4335 is, of course, a sub-heading of these interactions and I might make here a brief point that is not touched on in my prepared statement, which is that this Subcommittee may wish in due course to consider the potential relationship between the proposed National Center for Biological Diversity and Environmental Research and the kinds of focused responsibility for addressing long-term trends that have been suggested in earlier legislation.

The Year 2000 Committee worked on one draft. In any case it is quite clear that there is no place within the executive branch where responsibility is accepted for looking at the adequacy of the data being developed, its consistency and at the strengthening at the same time of the capacity to understand these developments.

There is, I think, a manifest tendency on the part of many conservatives to be suspicious of learning too much lest it tempt us to intervene too deeply. The idea seems to be that if we look too far ahead we will want to plan. If we want to plan, we will want to

intervene. If we intervene, we would enlarge the role of Government too much, and oh, dear, what then happens to the private sector?

Of course, that chain of reasoning overlooks the fact that the need for knowledge, the need to be able to understand the systemic interrelationships among long-term trends is a need as important or even more important for the private sector itself than for the Government. There is no reason to believe that the improvement of the capacity to understand these interrelationships is less important to the private sector than to the Government. On the contrary. And indeed there are needs for such understanding and information that go beyond the United States. They affect the world community as a whole, and if there is any powerful fact whose time has come in our era, it is the awareness that all significant global developments today are systemic and systemically interrelated.

The task of political leadership in the foreseeable future, as well as that of business leadership and educational leadership, is both to create greater public understanding of these realities as well as to think through what kinds of responses to them and what new institutions and adaptations of existing institutions may be appropriate for them.

All of this, Mr. Chairman, bears on the points that are touched on in my prepared statement to the extent that it stresses the need for an approach to understanding ecology, biodiversity and the systematic relationships among these things through a greater emphasis on field natural history studies. There has been a tendency over recent decades to allow the role of the field naturalist to be subordinated by developments in narrow, specialized areas of biology at the expense of seeing the world of biota in its own set of systemic interrelationships, and so what I have suggested here is that you may want to consider some broadening or clarification of H.R. 4335 to bring within its scope the support of activities in the area of field natural history, both the conduct of field studies and the support of teaching in this area.

I have mentioned the earlier activities which expressed my longstanding interest in this area. I think I should mention here, as I do in the prepared statement, that another is my membership on the board of the Roger Tory Peterson Institute. The mission of this institute is to encourage and expand the teaching and practice of field natural history, which as I mentioned is, of course, the very kind of natural history that is fundamental to understanding the ecological interdependence and biological diversity of living things.

The Institute sees such teaching and practice as a bridge to an interest in the universe of science in its largest as well as its smallest dimensions. My own association with it derives from the lucky circumstance that I was a pupil of Roger Tory Peterson as a boy in school when he was working on the first edition of the Field Guide to the Birds of the Eastern United States. He was and still is an inspiring teacher and the Institute seeks to carry forward and perpetuate that set of priorities, indeed, I think, the very set of priorities that are reflected in this legislation.

The broadening, I suggest, derives from a reading of Section 9, which authorizes each agency represented on the Interagency Com-

mittee to participate in partnership grants with public agencies, private individuals and organizations for projects to maintain or restore biological diversity. Section 9 also directs each of these agencies to assess the adequacy of existing environmental programs for training of personnel in the basic principles of ecology and systematics.

All this is fine as far as it goes, but it appears that the provision for partnership grants does not embrace training, and the reference to training seems to be limited to the personnel of the agencies themselves. What I am suggesting, Mr. Chairman, is that the language be broadened and/or clarified so as to assure that the partnership grants can include training and that the training in question be training of people as field naturalists or teachers of natural history and not only people who work for the agencies represented on the Interagency Committee.

In my statement, Mr. Chairman, I refer to a communication to me by the Chairman of the Roger Tory Peterson Institute, Paul Benke, who emphasizes the degree to which the policy inherent in H.R. 4335 is also the policy—the objective that in essence the Roger Tory Peterson Institute seeks to achieve.

Therefore, Mr. Chairman and the members of the Subcommittee, on the Institute's behalf as well as my own, I join in urging the enactment of the bill and hope that you will call on any of us associated with the Roger Tory Peterson Institute if we can be of future help in furthering that objective.

I will be glad to respond to any questions the Subcommittee may have. I cannot, however, guarantee to be able to answer them.

[The prepared statement of Mr. Richardson follows:]

Testimony of
Elliot L. Richardson
before the
Subcommittee on Natural Resources, Agriculture
Research and Environment
of the
Committee on Science, Space and Technology
U.S. House of Representatives
June 30, 1988

Mr. Chairman, I congratulate you on introducing legislation that will make possible positive action to respond to the urgent concerns addressed in the 1987 OTA report, "Technologies To Maintain Biological Diversity." I welcome this opportunity to testify in support of the National Biological Diversity Conservation and Environmental Research Act. As you pointed out in introducing the bill, the decline in the diversity of animal and plant life on this planet is indeed alarming.

In general, H.R. 4335 seems to me well-designed to meet its overwhelmingly urgent purposes. There is one area, however, in which it might be useful to broaden and/or clarify its coverage that is with respect to the teaching of ecology, biodiversity, and systematics. Section 9 authorizes each agency represented on the Interagency Committee to participate in partnership grants with public agencies, private individuals, and organizations for projects to maintain or restore biological diversity. It also directs each of these agencies to assess the adequacy of existing environmental programs for training of personnel

in the basic principles of ecology and systematics. The provision for partnership grants does not embrace training, and the reference to training seems to be limited to the personnel of the agencies themselves.

The purposes of the legislation would be better served, I believe, if it were made clear that partnership grants can be made to public agencies, private individuals, and organizations for projects to support curriculum development and model teaching or training programs. If the diversity of animal and plant life is to be maintained, Mr. Chairman, it will be because of teaching that inspires the concern and commitment of young people now in school and college and those who follow them in the remainder of this century and beyond.

In addition to my support of your bill simply as a concerned citizen, I have a special reason to be interested -- and to make this suggestion. As a boy I had the rare privilege of being a pupil of Roger Tory Peterson when he taught at the Rivers School in Brookline, Massachusetts. I now serve on the Board of Trustees of the Roger Tory Peterson Institute. The Institute's principal reason for being is to encourage and expand the teaching and practice of field natural history -- the very kind of natural history fundamental to understanding the ecological interdependence and biological diversity of living things. The Institute

sees such teaching and practice as a bridge to an interest in the universe of science in its largest as well as its small dimensions.

The Roger Tory Peterson Institute is actively analyzing the teaching of natural history in public schools with the objective of conceiving plans and tools to enhance this teaching. The outcomes we seek are substantial improvement in awareness of the natural world, the recognition of civic responsibilities, and a revitalized perception of all sciences. The Institute's study and research missions have as their end the extension of interdisciplinary work in the field. The Institute is actively encouraging and supporting interdisciplinary field studies in natural history. Measures of its success will be the reestablishment of the naturalist as a valued professional and the development of an interdisciplinary, accredited holistic program of multiple fields of natural history.

The thirty-eight projects now being supported by the Institute were selected with an eye to field and interdisciplinary priorities. The Institute will extend its contributions in these areas through the funding of additional and stipends for fellows using the Institute as an operations base. In addition, the Institute is actively encouraging and supporting interdisciplinary field studies

in natural history. Measures of success will be the reestablishment of the naturalist as a valued professional and the development of accredited holistic programs cutting across multiple fields of natural history.

As Paul A. Benke, the Chairman of the Institute, in anticipation of my testimony today, wrote me that this bill identifies "a basic international need - the recognition of the interdependence of living things and the need to see the natural world in an holistic perspective. . . . The agencies of state and federal governments are as fragmented as the sciences . . . Each agency has a special, segmented turf with a constituency that offers votes and lobbying resources to sustain that special turf. We do not have a national policy that states categorically that the preservation of the 'whole' is our first and overriding concern. That policy is inherent in Mr. Scheuer's bill, and it is a policy that needs extended private sector support - support that the Peterson Institute would be obliged to give as part of its mission."

On the Institute's behalf as well as my own, I join in urging the enactment of your bill, Mr. Chairman, and hope that you will call on us if we can be of future help in furthering that objective. And now, I will be happy to respond to any questions that you or any other member of the Subcommittee may have.

Mr. SCHEUER. Thank you very much, Mr. Secretary, for your excellent testimony.

We do have a number of members here so I am just going to ask one question and I'll ask unanimous consent that any of us can submit questions to you by mail and we'll hold the record open for 10 or 12 days. We'll submit questions in writing.

My question is this. As a leading member of the Roger Tory Peterson Institute, you and the Institute have been helping educate Americans about the enormous importance of our thinking more about the biota, about biological diversity, planning more, acting more, supporting more, encouraging more, facilitating more in all ways. You're deeply in the effort to educate Americans about the extraordinary importance of moving forward vigorously in this whole area fast, because time is running for many of our endangered or threatened species, both animal and plant.

What do you think we ought to be doing as a society above and beyond this bill to move toward a nation that is more ecologically aware and environmentally literate, let us say, and what do you think the Federal Government's role should be in all of this? What should we be doing above and beyond sponsoring this bill, which I am very happy and proud to say you seem to support.

Mr. RICHARDSON. I have no ideas for a Federal role, Mr. Chairman.

Mr. SCHEUER. You say you have no ideas?

Mr. RICHARDSON. Going beyond the ones that are identified in the bill—save for the two points I have already mentioned.

Mr. SCHEUER. Education.

Mr. RICHARDSON. One is, as I say, the—you might include the potential for supporting educational efforts, but it would need to be pretty carefully drawn in order to make quite clear exactly what kind of education it is you are supporting. Otherwise, I suppose, the result would have to be to expand the pricetag on the bill beyond any possibility of support.

But the other thing, as I've said, is that I think there is a Federal role in doing a better job in seeking to develop understanding of all the systemic interrelationships that affect biota, including ourselves as human beings, and I think we have a generally ostrich-like attitude in such matters. It is almost as if we didn't really want to see clearly what may happen, with the result that we deal fitfully with these things, whether it is the ozone layer or the greenhouse effect that's now being talked about. The question is what, if anything, we will do—and it may be that the Center that you propose is the single most practical step that could be taken, which could then in turn help to create broader public understanding as well as develop the data that point to the fact that you really can't address the problem of the conservation of biological diversity unless you also address the combustion of fossil fuels and other phenomena that affect the survival of biological diversity.

Mr. SCHEUER. Congresswoman Claudine Schneider.

Ms. SCHNEIDER. Mr. Secretary, I have a question that would reflect your experience as an ambassador, as Secretary here in the United States. They are both national and international. Insofar as your national experience is concerned, how would you suggest that the coordination of information among the various agencies take

place? You have a lot of experience in watching these agencies either succeed or fail. Is there any recommendation that you would like to share with us as to how best to accomplish that cross-pollination of information among all the Federal agencies?

Mr. RICHARDSON. I think it is fair to say, Miss Schneider, that coordination, cross-pollination, integration, synergism, all those words, are goals that the Federal Government is very poor at fulfilling. You could take the example of international economic policy, and it is true almost everywhere you look that the very creation of bureaucratic institutions tends one to, focus attention on immediate short-term problems and two, to create jurisdictional territoriality.

Ms. SCHNEIDER. Do you see any innovative mechanism that we could do to try to break down that trend?

Mr. RICHARDSON. I think as I just said the proposed Center can make such a contribution. I have thought and I also mentioned, that there needed to be a focal point in the Executive Branch, in the White House, that would address this wide array of systemic interrelationships, in order to improve data collection and so on.

Ms. SCHNEIDER. Carrying that to the international front, you mention in your testimony that the purposes of the legislation would be better served if it were made clear that partnership grants could be made to public agencies, private individuals, organizations for projects, to support curriculum development, model teaching, or training programs.

In your experience as an Ambassador, have there been some agencies that have done better than others internationally in working for matching grants or training programs, grants that are coupled with training programs? AID has a number of them and AID is now getting more involved in the whole biological diversity challenge.

Mr. RICHARDSON. The whole economic development area is one question in, which as you well know, the recognition of environmental implications has been given much greater priority. This is true in the World Bank as well. That, I think, is a welcome development. The Brundtland Commission recommendations reflect a large gain in the understanding of developing countries that sustainable growth depends on giving better recognition to environmental and conservation related concerns. These, I think, are certainly encouraging developments. Among agencies of the U.S. Government that help support such things, there has been a long history. That kind of cooperation is most successful the more directly humanitarian the cooperation is or the more mature the science that is being supported. NIH, for example, supports work around the world.

Other examples are the rehabilitation programs, programs in mental retardation, as well as economic development and increasingly environmental concerns.

I do not think the United States is doing enough by any means in supporting the U.N. Environment Programme, in which we have been extremely grudging.

Mr. SCHEUER. Mr. Secretary, when you mentioned you would like to see a more enhanced role in the Executive Branch on the ques-

tion of biodiversity, what specifically did you have in mind? What would some of the options be?

Mr. RICHARDSON. There are of course a lot of ways in which existing Federal programs may or may not contribute to reducing damage or enhancing protection. Miss Schneider's question addressed the problem of communication and coordination.

There is EPA, of course. There are environmental impact statements required for various kinds of projects. There is the Council on Environmental Quality.

Mr. SCHEUER. Isn't that in sort of a moribund condition right now?

Mr. RICHARDSON. It certainly has not had the glamour or excitement associated with it in recent years that it was launched with. The Center proposed in this legislation certainly ought to have some relationship to the Council on Environmental Quality.

Mr. SCHEUER. Sure. Would it make sense to try and revive it for the next President, whoever he or she may be, to give it great leadership and try to make it a player, an active player?

Mr. RICHARDSON. Yes, I think it would. It would be a way of addressing the other points I touched on. It has also been pointed out that we have not had any—what has happened to CEQ has also happened to the role of the Science Advisor. Under Eisenhower, the Science Advisor was the Chairman of a very distinguished board as I recall, and of course concerns with biological diversity, biodata, in terms of the exciting work in science going on today, are at least more than half perhaps of all fundamental science. Again, you could have potentially greater priority given to the role of scientific advice. There are lots of ways structurally of dealing with these things.

You begin with recognizing the urgency of the problem, and whatever else can be said about the specific proposals in your legislation, it does contribute to upgrading concern with the problem and raising the level of public consciousness.

Mr. SCHEUER. You would recommend that the counterpart in terms of upgrading the level of attention and consciousness in the Executive Branch might be to really revive and give greater leadership to the Council on Environmental Quality. Is there anything else you would suggest as a specific move that the Congress could cooperate in to provide greater leadership and awareness and concern in the Executive Branch?

Mr. RICHARDSON. I'd like to see you push this legislation as far as it will go because as I say, and I'm sure you would all agree, you could pick up a report like the OTA report and come up with a variety of specific devices to focus attention on the concerns addressed in that report. The key thing is to give momentum to a vehicle that will attract such attention and get people thinking about it. I see no reason at this juncture—I haven't got a better idea. One can see how if it did achieve momentum with the driving force you alluded to earlier on the part of this proactive Subcommittee, then it would engage people more seriously in the question of whether this is the best of all possible structural devices. That would be a gain.

Mr. SCHEUER. That is very useful and important. I thank you for calling us a proactive Subcommittee. That's the nicest thing that

has ever been said about us since the day we were called a bunch of tree-huggers.

Congressman Henry?

Mr. HENRY. Thank you, Mr. Chairman. I would just like to express appreciation again to the Secretary for his comments and your support of this legislation. One of the problems really is the nature of the time line; this is really a race against time. The general public just doesn't have any sensitivity to how short the time is relative to a significant proportion of the biological community with which we live and the risk in which we have placed it.

You began your comments by raising the issue of conservatives. Let me say this because I have read some of your statements in years past on this which have been splendid, reminding those who use the term most freely and loosely in our political world today that the whole classical notion of a political conservative was one who saw the present as something which lives in communion with past and future, that it seeks to honor the decisions of the past and thus considers change carefully because it considers the decisions of the past not just as tradition but because they were decisions which were made and those voices ought to be heard, but also it considers its mandate the charge of the future and nothing could be a more noble conservative cause than to honor the past and preserve it for its future in this case.

I simply appreciate your calling that to all of our attention. Thank you for being here.

Mr. RICHARDSON. Thank you very much. I couldn't agree with you more. I can't resist adding that the only way of addressing the race against time is through the enlargement of imaginations. It is perhaps somewhat paradoxical but also a truism that the only tool we have with which to grasp reality is the imagination. If you can gain some sense of the past and understand the world you live in somewhat through the outreach of imagination, you thereby have gained the capacity to get some feel for the dynamics of the changes that will be brought about in the future.

I think that it is the essence of conservatism to be concerned about the preservation of the things we value and that most fundamentally is what this bill is about.

Mr. SCHEUER. Mr. Secretary, you have said it all when you talked about the goals of conservatism to preserve that which is worth preserving and you did that nobly in your career as Attorney General, in a way that history will never forget. You have reflected that same concern and deep commitment to basic conservative values here today, just as the Supreme Court of the United States did in its decision yesterday. I don't want to politicize this meeting. I guess I better not continue any further.

You have given us superb testimony and you have been a lifelong exponent of enlightened, thoughtful conservatism. It still lives in the Supreme Court and it lives in Elliot Richardson. We are very grateful for your testimony. Thank you very much.

Mr. RICHARDSON. Thank you very much, Mr. Chairman, members of the Subcommittee.

Mr. SCHEUER. Now we will hear from a very distinguished panel, five members. Dr. Thomas Lovejoy, Dr. Peter Raven, Dr. John Buffington, Mr. John Flicker and Mr. Daniel Boone.

Mr. SCHEUER. Well, gentlemen. Welcome. We very much appreciate your coming to give us testimony. Your prepared statements will all be printed in the record in full at this point. So I would ask each of you to chat with us informally for about five minutes and I'll read your testimony hopefully. Just chat with us as if we were together in a living room. So we'll start in the order that I mentioned.

Dr. Thomas Lovejoy, Assistant Secretary for External Affairs of the Smithsonian Institution. Please commence your testimony, Dr. Lovejoy. We're very happy to have you with us.

**STATEMENT OF DR. THOMAS LOVEJOY, ASSISTANT SECRETARY
FOR EXTERNAL AFFAIRS, SMITHSONIAN INSTITUTION**

Dr. LOVEJOY. Thank you, Mr. Chairman. I obviously am grateful for the opportunity to testify before this committee and have been enriched by the discussion that preceded this panel. I'd like to note at the outset that this legislation, of course, addresses only the United States' national part of a global problem and that looking at the problem in global sense, the United States' portion of it is in one sense a trivial portion.

Those who would dismiss it in that light, I don't think are being thoughtful at all, because the essence of the whole problem of biological diversity is that each and every little piece of the problem is important and worth saving. Furthermore, I can say from my experience of 14 years at the World Wildlife Fund before I came to the Smithsonian, that the example of the United States in these matters is of towering importance in the developing countries where these problems are greatest.

So there's absolutely no question about the importance of this country taking a leadership role on such issues. I also should note that the Club of Earth, a group of distinguished biologists who are members of The National Academy has taken note of the importance of this issue and has made a statement in support of this legislation.

In your original letter to Secretary Adams, you sought our response to this legislation and I understand that the response has finally made its way through the tortuous channels of government. It does take note that the Smithsonian as a trust instrumentality must be careful to avoid getting into regulatory matters. It must avoid getting into policy matters, but I would immediately make the distinction between that and providing the intellectual and academic basis on which policy matters must be based.

Mr. SCHEUER. I find it hard to understand that the Smithsonian would really want to stay away from consideration of policy matters. Isn't that really your mission?

Dr. LOVEJOY. Our mission is to increase knowledge and diffuse it. That does not mean that one stays away entirely from policy, I mean, the policy must be based on knowledge, but that's where we want to have our stance, maintain our credibility outside the political process but we intend to be enormously supportive in the academic sense.

Having made that point, I'd like to say that I, personally, and the Institution have a long history of interest in this particular

topic and concern about it, and as far as the Institution is concerned I recall that one of the things it did in the 1970s was produce a list at the request of Congress of the endangered plant species of the United States.

So, it's part and parcel of what the Institution has concerned itself with over the years, and indeed the national collections are an important part of determining what needs to be done and I would note that it was taking on the national collections which led the Congress to provide federal dollars in support of the Institution back in the middle of the 19th Century.

As I think about what this bill is trying to address, it's trying to address a cohesive national effort on this topic. I think there are three basic reasons for such a need. One is just that the basic listing and description of biological diversity in this country is still incomplete. I'm reminded of Professor Ed Wilson at Harvard saying you could go anywhere in this country and pick up a handful of soil, and the majority of organisms in it would be new to science.

Now as we wander around the country we look at the vertebrates and we look at the plants and few people look at the invertebrates, but a large portion of the invertebrate fauna, particularly soil fauna, is very poorly known and I just simply have to point out that it's the plants and the wiggles and squirmies that really run this world and we're along for the ride.

So there's an important need to fill in those kinds of blanks. In addition the various existing efforts and the state biological surveys—even the Heritage Programs of the Nature Conservancy—in the end do not constitute a total comprehensive picture and that is the fundamental basis for needing a national effort in this regard.

Furthermore, one cannot look at the picture of biological diversity as though it was a static one—once a species is recorded from a particular spot that it will always be there. A colleague of mine from graduate school, who as a young boy collected butterflies, inadvertently stumbled in the middle of rural Ohio on a decline in biological diversity in that particular spot. That kind of thing discovered just by boyhood whim, in a way is probably going on all over this country and needs to be monitored.

So lastly let me just summarize by saying that the Smithsonian Institution would be happy to be involved in the scholarly underpinnings of efforts at addressing this problem of endangered biological diversity that deals with essentially the most important resources in support of society. There is nothing more nonrenewable than an extinct species. Thank you.

[The prepared statement of Mr. Robert McC. Adams follows:]



SMITHSONIAN INSTITUTION

Washington, D.C. 20560
U.S.A.

June 29, 1988

Honorable James H. Scheuer
Chairman
Subcommittee on Natural Resources,
Agriculture Research, and Environment
Committee on Science, Space, and Technology
U. S. House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

Thank you for requesting the views of the Smithsonian Institution on H.R.4335, a bill to "establish a national policy for the conservation of biological diversity; to support environmental research and training necessary for conservation and sustainable use of biotic natural resources; to establish mechanisms for carrying out the national policy and for coordinating related activities; and to facilitate the collection, synthesis, and dissemination of information necessary for these purposes."

After designating the measure the National Biological Diversity Conservation and Environmental Research Act, H.R.4335 provides for findings, definitions, and purposes. In Section 5 it establishes public policy with respect to biological diversity; requires that all Federal policies and programs be consistent with the goals of that policy; amends the National Environmental Policy Act of 1969 to include the impacts on biological diversity; and requires the President's Council on Environmental Quality to set guidelines for the consideration of biological diversity in the preparation of environmental impact statements, and to identify, in consultation with others, biotic communities in danger or of special concern.

A National Center for Biological Diversity and Environmental Research is established by Section 6. The Center would develop a cooperative network of Federal, State, and private agencies for data collection, oversee the review of existing information, identify and plan studies, conduct field surveys and supplementary research, make recommendations regarding the use of technology and data, publish and otherwise provide information,

maintain lists of biotic communities in danger or of special concern, and raise funds to support these activities. The Center would have a governing board of nine members including one representative of the Smithsonian Institution.

Section 7 establishes an Interagency Working Committee on Biological Diversity to coordinate Federal conservation efforts and to implement the coordinated Federal biological diversity strategy that is outlined in Section 8 of the measure.

Additionally, H.R.4335 provides for biological diversity grant, research, and training programs in Section 9 and for the establishment of a National Scientific Advisory Committee on Biological Diversity as a permanent entity in Section 10. This committee also would include a representative of the Smithsonian Institution.

Biological diversity has long been a concern of the Smithsonian. Since its beginnings in the mid-1840's, the Institution has been committed to study, documentation, and preservation of the earth's biological diversity. Our present research programs are extensive and far-flung, involving several hundred scientists in biology and anthropology working at the National Museum of Natural History, the National Zoological Park, the Smithsonian Tropical Research Institute, and the Smithsonian Environmental Research Center. In addition, the Institution has been developing a large project in collaboration with UNESCO's Man and the Biosphere program to produce a data-recording and long-term monitoring protocol for the world-wide Biosphere Reserves network and has conducted a series of workshops for third-world scientists.

In the fall of 1986 the Smithsonian co-sponsored the highly successful National Biodiversity Forum here in Washington, D. C. with the National Academy of Sciences. Among the topics addressed by the participants were the challenges to the preservation of biodiversity, including the monitoring, restoration, protection policies, and alternatives to destruction. More recently, a major new exhibition on tropical rainforests has opened at the Institution's International Gallery. It was developed in an effort to communicate specifically to the public a range of concerns relating to biological diversity.

The Smithsonian Institution defers to the appropriate agencies of the Executive Branch for recommendations regarding the advisability of enacting of H.R.4335. We understand, however, that the Administration opposes enactment of H.R.4335 because its objectives are currently being pursued under existing authority.

With respect to the Smithsonian itself, it should be noted that the Institution is a trust instrumentality of the United States established to carry out the will of James Smithson "for

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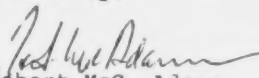
the increase and diffusion of knowledge." Administered by a Board of Regents that includes representatives of all three branches of the Government and private citizens as well, the Smithsonian is independent of the Government itself. In a report issued March 3, 1855, a House committee stated that

"The Government of the United States, in accepting the great trust conferred, pledged itself to carry out the objects of the founder to administer the funds with a distinct reference to the requirements of the will, and to keep the institute [sic], which bears the name of the founder, separate in all its relations from any and every other; to give it a distinct and substantive existence, and insure independence and efficiency to its operations."

The Smithsonian does not establish or participate in the establishment of Government policy, nor does it perform Government functions. However, consistent with its mandate for "the diffusion of knowledge" the institution has across the years acted in an advisory capacity to a number of public and private entities.

The Office of Management and Budget advises that there is no objection to the submission of this report from the standpoint of the Administration's program.

Sincerely,


Robert McC. Adams
Secretary

Mr. SCHEUER. Thank you very, very much, Dr. Lovejoy. Now we'll hear from Dr. Peter Raven, Director of the Missouri Botanical Garden. Dr. Raven.

**STATEMENT OF DR. PETER H. RAVEN, DIRECTOR, MISSOURI
BOTANICAL GARDEN**

Dr. RAVEN. Thank you very much, Mr. Chairman and members of the subcommittee. I'm very pleased to be able to make a few remarks for you today on behalf of the Association of Systematics Collections and the American Institute of Biological Sciences. Basically I think the way I'd like to introduce the problem is as follows.

The United States is obviously very successful in the area of biological conservation. We have a whole host of federal agencies that are involved in it, that are dedicated to it. We have many outstanding private institutions in the United States, the Nature Conservancy, the World Wildlife Fund, Audubon Society—all addressing this problem—and we really do have a national will to get on with biological conservation.

The question then would seem to be why in the midst of all that success is there any problem, or perhaps what opportunities do we have—

Mr. SCHEUER. And why is the federal government through its constituted agencies in this area doing so very, very little?

Dr. RAVEN. The answer is found in the proposed legislation. There isn't any coordination in the federal government. The two biggest problems are in my view: (1) that there is no national policy for the conservation of biological diversity and no mechanism for generating a national policy. Whereas any agency can testify and a number have testified that they're deeply devoted to the solution of this problem, no agency can claim under the existing structure of things to be able to generate or to cooperate in the production of a national biological strategy.

The other part, and the part that I need primarily to address, is the matter of information. Information is basically inadequate. All agencies and all private organizations are basically carrying out their conservation work in a relatively uncoordinated way and in a way which is based on the implicit assumption that there's plenty of information available—that it's readily available and that its use should not present many problems.

In my view, the arguments for a National Center for Biological Diversity are well stated by the functions that are attributed to the National Center in the legislation. To carry on with improving our knowledge base on biological diversity, we need a cooperative network to oversee a review of the available information and to generate new information. We need to build databases which include specimens, published material, computerized information and very importantly, adequately trained people who can address the various kinds of organisms found in this country and develop information about them.

It's well that earlier in testimony for this subcommittee you noted the special problems of Hawaii. For example, of the roughly 950 species of native plants in Hawaii, roughly 275 are endangered at the present time. As a side issue, I just want to underline the

fact that Congress would be giving a very wonderful signal to the rest of the world if it did pay special attention to the problems of Hawaii, so obviously endangered and so important.

Moving on to the 48 contiguous states, we tend to think of them as having a relatively small sample of the world's biological diversity. There are however, about one out of 12 of all of the species in the world found within the 48 states. About 20,000 species of flowering plants, about 300,000 to 400,000 other organisms, at a conservative estimate, and, of course, you've had excellent testimony and language relating to the economic importance of these organisms, their role in the functioning of ecosystems, their role as pests and parasites of economically important plants and animals, and, to those I might add one other field, their role in genetic engineering.

Genetic engineering affords us great opportunities for improving the performance of plants, animals, and microorganisms in the future, but in order to improve their performance we need genes. In that sense, each organism can be viewed as a collection of genes, a unique collection, that can be used for our purposes but obviously only if it continues to exist.

Now, as my colleague, Dr. Lovejoy, has already pointed out, we tend to focus on vertebrates and flowering plants, yet few people understand that dozens of new species of vertebrates and flowering plants are described from within the United States every year. For example, here's a publication that came out last month, June, 1988. This is a new species of salamander from northwestern Georgia which is about eight inches long, in a group of organisms that you would say is very well-known, but which was discovered for the first time in 1986 as a completely novel organism.

[A copy of this publication follows:]

A NEW SPECIES OF ROCK-CREVICE DWELLING *PLETHODON* FROM PIGEON MOUNTAIN, GEORGIA

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ABSTRACT: A new species of woodland salamander of the *Plethodon glutinosus* group from Walker County, in northwestern Georgia, is described. It is known from only two areas on the eastern slope of Pigeon Mountain, a spur of Lookout Mountain. Most individuals have been taken in and around limestone crevices in habitat characteristic of and also occupied by the green salamander, *Aneides aeneus*. The new species has a color pattern different from that of any other species of *Plethodon*. Although the new species is clearly assignable to the *Plethodon glutinosus* group, it is distinct in possessing enlarged toes that appear to be modified for climbing.

Key words: Amphibia; Caudata; Plethodontidae; *Plethodon glutinosus* group; *Plethodon petraeus* sp. nov.; Georgia

ALTHOUGH herpetologists have been surveying and describing the herpetofauna of the eastern United States for over 200 yr (Adler, 1978), our knowledge of the herpetofauna of many areas is still incomplete. Besides the continual discovery of cryptic species by biochemical, chromosomal, and morphometric techniques, non-cryptic species are also still being found: for example, *Rana okaloosae* (Moler, 1985). In this paper, we describe a new species of salamander of the genus *Plethodon* from northwestern Georgia that is both genetically and morphologically distinct (Fig. 1).

Plethodon petraeus sp. nov.

Diagnosis.—*Plethodon petraeus* is a member of the *P. glutinosus* group (Highton and Larson, 1979). It has feet that are distinct from those of all other species of the group (Figs. 2, 3). The fourth toe on the fore feet and the fifth toe on the hind feet are disproportionately long in *P. petraeus* and extend beyond the second, or

penultimate, joint of the adjacent digit when compressed against it. The fifth toe on the hind feet extends beyond the second joint of the fourth toe (on at least one foot in 99% of the specimens examined) and usually extends 25% or more of the length of the penultimate phalanx (at least one foot in 93% of the specimens examined). The fourth toe on the front feet extends about 50% the length of the penultimate phalanx of the third toe (on at least one foot of all specimens examined). In other members of the *P. glutinosus* group, the fifth toe on the hind feet rarely extends past the second joint of the adjacent digit, and only the tip of the fourth toe on the front feet usually extends past the penultimate joint of the third toe.

The digits of both the fore and hind limbs in *P. petraeus* are broad and flattened (Fig. 4). The tips are blunt, not rounded as in other members of the *P. glutinosus* group, and the pads at the toe tips are more expanded. Osteologically, this



FIG. 1.—An adult female paratype of *Plethodon petraeus* (USNM 267135).

is reflected by expansion and slight recurving of the distal portion of the terminal phalanges (Fig. 3).

Plethodon petraeus also has extensive webbing between the digits. This is especially evident on the hind feet, where the webbing between the second and third, and third and fourth toes contacts these digits distally at least as far as the joint between the first and second phalanges (phalanges numbered in increasing order distally) (Fig. 2). Only in some specimens of *P. caddoensis*, *P. fourchensis*, *P. ouachitae*, and specimens from some populations of *P. glutinosus* (those from west of the Mississippi River) does the webbing reach this joint as in *P. petraeus*. In all of these species, the feet are much smaller than those of *P. petraeus*. In other members of the *P. glutinosus* group, the webbing does not reach the joint between the first and second phalanges, except in some individuals as a narrow flange. The webbing in *P. petraeus* is typically translucent or heavily pigmented with white iridophore spots. Melanophores, when present, are usually distributed in patches that rarely cover the entire web. In contrast, melanophores in most individuals of other

species of the *P. glutinosus* group usually are distributed continuously over the web or clustered in spots scattered over the entire web.

The feet of *P. petraeus* are larger and the limbs longer than those of most other members of the *P. glutinosus* group. The only member of the *P. glutinosus* group with digits approaching those of *P. petraeus* in length is *P. yonahlossee*, and only *P. yonahlossee* has limbs that are as long as those of *P. petraeus* (David E. Carr, unpublished data).

Living specimens of *P. petraeus* are easily distinguished from most other *Plethodon* by the reddish-brown dorsal color pattern. The only other two species of the *P. glutinosus* group with similar pigmentation are *P. yonahlossee* and *P. ouachitae* (Rich Mountain type). *Plethodon petraeus* differs from *P. yonahlossee* in having dorsal pigmentation (referred to here as reddish-brown) that usually varies between burnt umber (Ridgway, 1886) and moderate olive brown (Kelly, 1965; McKnight, 1977), in contrast to the more reddish "chestnut" pigmentation of *P. yonahlossee*. This pigmentation extends onto the head and well past the base of the tail in

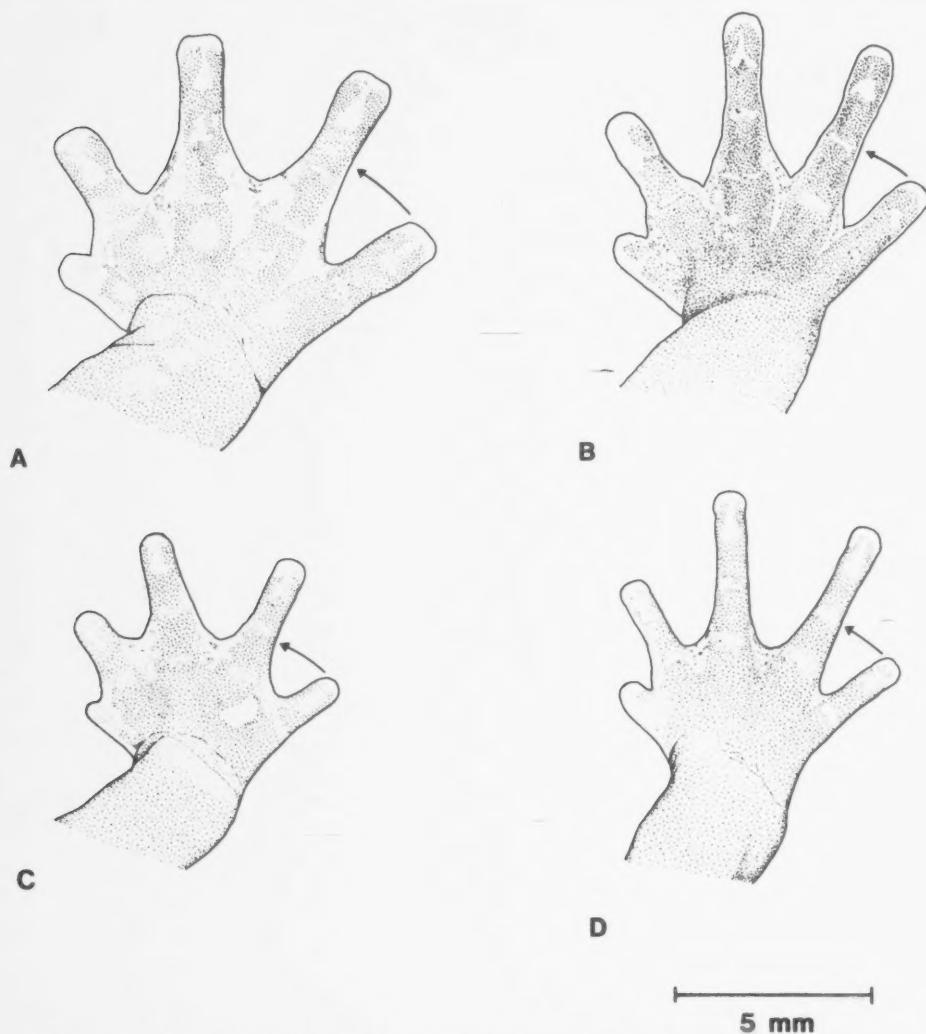


FIG. 2.—Dorsal aspect of the right hind foot of *Plethodon petraeus* and three representative species of *Plethodon*: (A) *P. petraeus*, USNM 267123, SVL (snout to anterior vent length) = 65 mm; (B) *P. yonahlossee*, USNM 253829, SVL = 61 mm; (C) *P. ouachitae*, USNM 255305, SVL = 59 mm; (D) *P. glutinosus*, USNM 241106, SVL = 63 mm. The arrows show the relative length of the fifth toe when compressed against the fourth toe.

P. petraeus, but not in *P. yonahlossee*. The dorsal coloration of *P. petraeus* most closely resembles that of some Rich Mountain type *P. ouachitae*, which also have extensive reddish-brown pigmentation that extends onto the head, and associated white spots and brassy flecking. Most *P. ouachitae*,

however, have much less dorsal reddish-brown pigmentation than *P. petraeus*.

Holotype.—U.S. National Museum of Natural History (USNM) 267105, an adult male collected at 34°39'50" N and 85°22'10" W, at an elevation of 310 m, at the mouth of Dickson Gulf on the eastern slope of

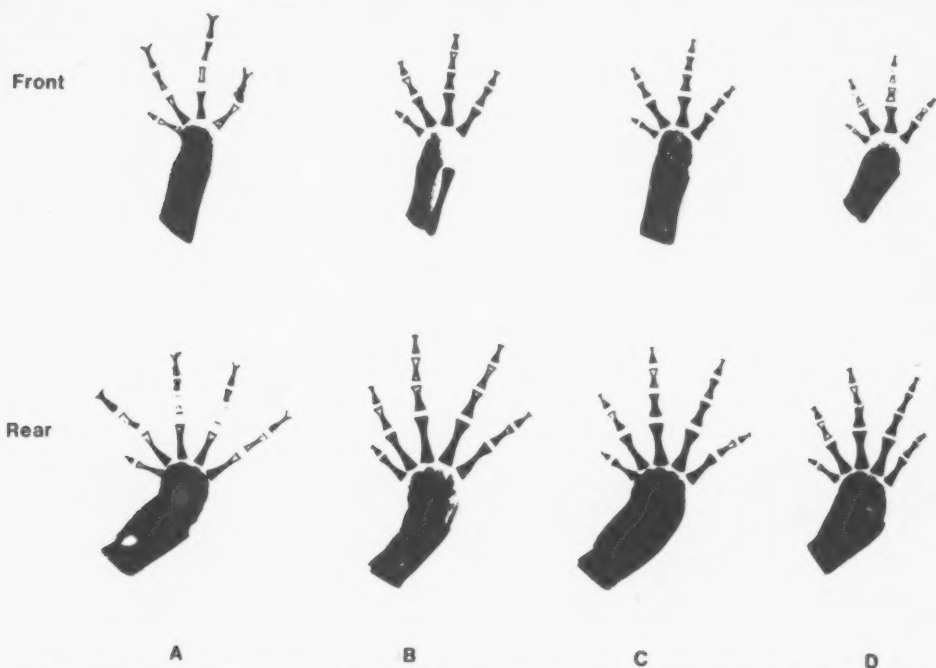


FIG. 3.—Radiograph of the fore and hind feet of (A) *Aneides aeneus*, Audra State Park, Barbour Co., West Virginia; (B) *Plethodon petraeus*, USNM 267151; (C) *P. yonahlossee*, USNM 253862; (D) *P. glutinosus*, USNM 257100.

Pigeon Mountain, Walker County, Georgia (locality 1, Fig. 5), on 24–25 May 1986, by Jeremy F. Jacobs and Addison H. Wynn.

Allotype.—USNM 267106, an adult female with the same collecting data as the holotype.

Paratypes.—USNM 267107–267128 with the same collecting data as the holotype, and USNM 267129–267231 from 34°36'00" N and 85°23'50" W, at an elevation of 226 m, south of the mouth of Harrisburg Gulf on the eastern slope of Pigeon Mountain, Walker County, Georgia (locality 2, Fig. 5).

Description of holotype.—Before preservation, length from tip of snout to anterior angle of vent 65 mm, to posterior angle of vent 69 mm, and total length 143 mm; 16 costal grooves; nine vomerine teeth on each side. Head width at widest point 10 mm, head length (snout to gular fold) 16 mm; front limbs 18 mm in length, and hind limbs 20 mm in length.

In life, iris flecked with brassy irido-

phores and dorsum covered with reddish-brown pigmentation; top of head covered by reddish-brown pigmentation, extending ventrally to level of eyes; eyelids also with brassy flecks. Posteriorly, reddish-brown pigmentation extended past base of tail for 31 mm. Small white iridophore spots with associated brassy flecks occurred throughout the reddish-brown dorsal pattern. Dorso-laterally, reddish-brown pigmentation graded into black with white iridophore spots flecked with brassy. Yellow iridophore spots without brassy flecking formed a ventro-lateral band, from angle of jaw and lower side of head posteriorly, breaking up on tail immediately posterior to hindlimb insertions. Patches of iridophore pigmentation also occurred on limbs and feet. Ventral surface black, except for chin, which had some reddish-brown pigmentation, and throat and pectoral region, which were heavily mottled with yellowish pigmentation.

After preservation, the reddish-brown

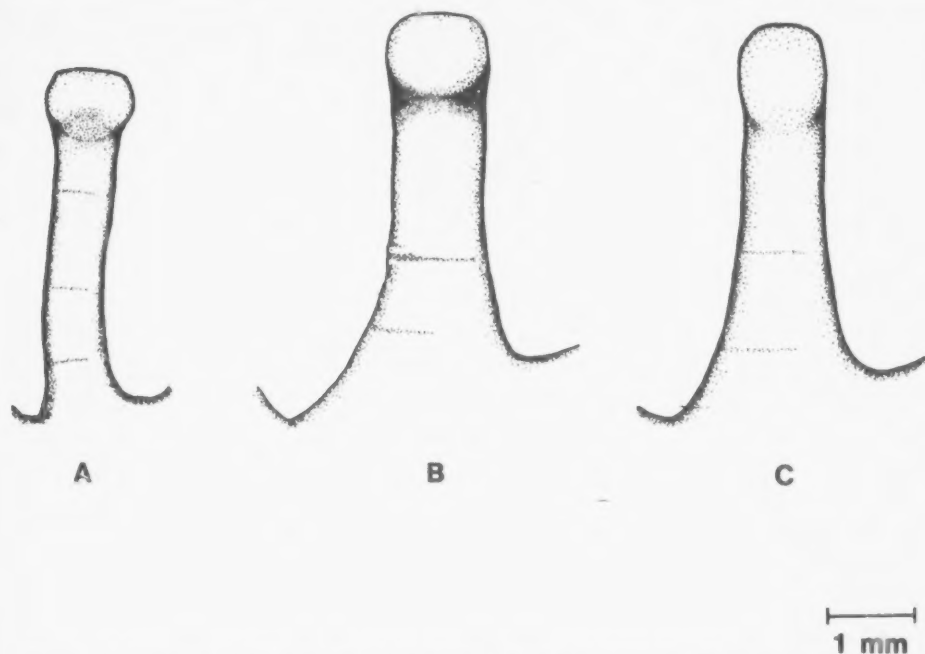


FIG. 4.—A ventral view of the fourth toe on the right hind foot of (A) *Aneides aeneus*, USNM 201020, SVL = 50 mm; (B) *Plethodon petraeus*, USNM 267122, SVL = 61 mm; (C) *P. yonahlossee*, USNM 253862, SVL = 68 mm.

coloration has been lost revealing dark background pigmentation. Some iridophore spots remain on dorsum, but the lateral spots have mostly disappeared. Soles of fore and hind feet are flesh colored. The dorsal surface of webbing is largely nonglandular, devoid of melanophore pigmentation, and translucent. The digits are broad and flattened in appearance, and expanded at the tip, which is blunt. The mental gland is rhomboidal in shape, 4.5 mm along the longitudinal axis and 4.5 mm transversely, with the mid-point of the transverse axis anterior to the center of the longitudinal axis.

Description of allotype.—In life, 83 mm snout to anterior angle of vent, 88 mm to posterior angle of vent, total length 183 mm. Head width at widest point 13 mm; head length from snout to gular fold 19 mm; length of front limbs 22 mm; right rear limb 23 mm, left rear limb 25 mm; 16 costal grooves; vomerine teeth 11 (right), 12 (left). Abundant yellow spotting on chin

and sides; moderate amount of yellow spotting on venter. Reddish-brown pigmentation on dorsum extended to within 77 mm of tail tip with scattered reddish-brown spots to 11 mm of tip. Otherwise, coloration and appearance of living and preserved specimen similar to holotype.

Variation.—Ontogenetic variation in the number of vomerine teeth (Fig. 6) indicates that *P. petraeus* has fewer teeth than *P. yonahlossee* but is similar to the other large species of the *P. glutinosus* group (Highton, 1962; Pope, 1950). As in other species of the *P. glutinosus* group, *P. petraeus* is sexually dimorphic in size. The 10 largest females have a mean snout-anterior vent length (in life) of 79.5 mm (range 77–84 mm) and the 10 largest males have a mean of 71.2 mm (range 69–73 mm). *Plethodon petraeus* typically has 16 costal grooves, but four of 81 individuals examined had 15, and one individual had an asymmetrical number, with 16 on the left and 17 on the right. The mental glands

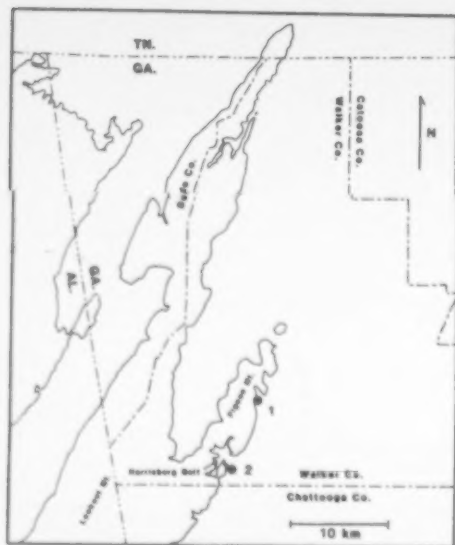


FIG. 5.—The known distribution of *P. petraeus* in northwestern Georgia. Site 1 encompasses three separate localities at which *P. petraeus* has been found, including the type locality. The 460 m contour line is shown.

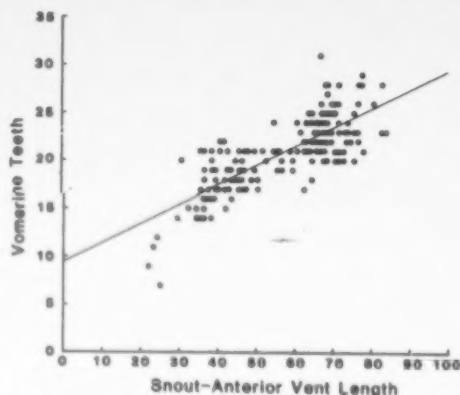


FIG. 6.—Variation in the number of vomerine teeth in a sample of 152 *P. petraeus*. The regression line [vomerine teeth = $0.20(\text{SVL}) + 9.52$] was calculated by the least squares method.

of three males were rhomboidal, six were oval, and 15 were intermediate in shape.

Small individuals have less extensive iridophore pigmentation on the sides and throat, and lack the extensive reddish-brown pigmentation on the dorsal trunk. Instead, they have a variable pattern of from 3–12 alternate or opposite reddish-brown spots. As in other species of *Plethodon* with juvenile red spots (*P. jordani*, *P. ouachitae*, *P. yonahlossee*, and *P. wehrlei*), these spots often remain as pigmentless areas after preservation. The dorsal pigmentation on the head and tail is otherwise similar to that of adults. In larger specimens up to approximately 50 mm snout-vent length, the dorsal juvenile spots fuse into a "zig-zag" pattern, usually expanding in adults to cover the entire dorsum.

The extent to which the dorsum is covered by reddish-brown pigmentation, and the extent to which it grades into the black pigmentation on the sides, is variable. The reddish-brown pigmentation is usually reduced along the grooves of the head and

in the costal grooves, and gaps often occur within the pattern. In addition to the brassy flecks associated with white iridophore spots, brassy flecks are found scattered through the reddish-brown pattern in many individuals, especially juveniles. A few individuals have very little of the normal dorsal reddish-brown pigmentation present. The most extreme of these have a very dark dorsum with only faint traces of the typical reddish-brown coloration.

Variation, which may in part be ontogenetic, occurs in the dorsal coloration. The dorsum of juveniles is olive brown in color [most similar to moderate olive brown (Kelly, 1965; McKnight, 1977) or bistre (Ridgway, 1886)]. Larger individuals are more reddish to varying degrees. Although some are close in color to the juvenile coloration, most are burnt umber (Ridgway, 1886). Extreme individuals are closer in color to burnt sienna (Ridgway, 1886), especially in the region of the neck, and one individual that was not compared to a color chart had a "rust-orange" dorsum.

Habitat and range.—*Plethodon petraeus* is presently known from only two areas, 7.5 km apart (Fig. 5). Both are in limestone outcroppings of the "Bangor" group (Butts and Gildersleeve, 1948) on the eastern slope of Pigeon Mountain (a northeastern trending spur of Lookout Mountain) in northwestern Georgia. The

type locality is a steep rocky ravine, through which an intermittent stream flows, covered with hardwood forest (locality 1, Fig. 5). Specimens have been collected from cracks in the rocks and in detritus-filled crevices between the rocks. We have also found two *P. petraeus* (USNM 267232-267233) on a low rock outcropping at an elevation of 464 m, 0.67 km NNW of the type locality, and five (USNM 267234-267235, SSM 11814-11816) have been collected in the mouth of Pettijohn Cave at an elevation of about 300 m, 0.5 km east of the type locality.

The second area at which we have found *P. petraeus* is a boulder-strewn forested slope near the opening of Harrisburg Gulf (locality 2, Fig. 5). Specimens have been collected there in the mouth of a cave, as well as in rocky habitat similar to that at the type locality.

We have not been able to find *P. petraeus* in apparently suitable habitat either to the north or south of the known populations, or on the western side of Pigeon Mountain. Our failure to find *P. petraeus* elsewhere suggests that the range is limited. It appears, however, to be very common locally. We have found *P. petraeus* over an elevational range of 220-500 m on the slope of Pigeon Mountain, and it is usually very abundant where it is found, far outnumbering all other syntopic species of salamanders combined (*Aneides aeneus*, *Eurycea longicauda*, *E. lucifuga*, *Gyrinophilus porphyriticus*, *Plethodon dorsalis*, and *P. glutinosus*). If *P. petraeus* is widely distributed between localities 1 and 2, Harrisburg Gulf (a large trifurcated cove with a circumference of approximately 16 km that extends west into Pigeon Mountain between localities 1 and 2) may provide a considerable amount of habitat.

Remarks.—All individuals of *P. petraeus* that we have collected were found in close association with rock faces or crevices. Apparently *P. petraeus* is more scansorial than other *Plethodon*. In our experience, salamanders of the *P. glutinosus* group are usually not restricted to rock-crevice habitats (with the possible exception of *P. yonahlossee* in the extreme southern part of its range), and neither of the two sympatric species of *Plethodon*,

P. glutinosus and *P. dorsalis*, are common at the localities where *P. petraeus* is abundant.

Larson et al. (1981) noted that the genus *Aneides* is a derived offshoot of a *Plethodon*-like ancestor with several foot modifications interpreted as adaptations for climbing, most notably a rearrangement of the mesopodial elements of the feet and the presence of a ventral projection for tendon insertion on the terminal phalanges. Although *P. petraeus* has the mesopodial arrangement typical of *Plethodon* (Wake, 1966) and lacks a ventral projection on the terminal phalanges, other characteristics of its feet are unique in *Plethodon* and more similar to the feet of *Aneides*. These include digit length, a "supportive adaptation" that forms a morphocline in *Aneides* (Larson et al., 1981). *Plethodon petraeus* shares with *Aneides* elongate digits that have blunt, expanded tips, as well as terminal phalanges with broad distal tips (although not so broadly expanded as in *Aneides*). Furthermore, the fourth finger and fifth toe, which are proportionately longer in *P. petraeus* than in other *Plethodon*, are more similar in relative length to the fourth finger and fifth toe in *Aneides*.

Although *P. petraeus* appears to have toe modifications for climbing converging with those found in *A. aeneus*, it occurs in much higher numbers than *A. aeneus* in the rock-crevice habitat at the two sites on Pigeon Mountain. The rarity of *A. aeneus* is unexpected considering its adaptations for this type of habitat. The ecological relationships of these two species should be investigated.

Etymology.—The specific name, *petraeus*, is from the masculine Greek "petraeos" meaning among rocks or rock-dwelling. We suggest "Pigeon Mountain Salamander" as a common name.

GENETIC RELATIONSHIPS WITH OTHER SPECIES OF THE *PLETHODON GLUTINOSUS* GROUP

Highton and Larson (1979) compared all 26 species of *Plethodon* known at that time using an electrophoretic evaluation of 29 genetic loci. Six species (*P. glutino-*

sus, *P. jordani*, *P. ouachitae*, *P. caddoensis*, *P. fourchensis*, and *P. yonahlossee*) clustered together and were recognized as the *P. glutinosus* group. The same six species also were found to be similar to each other immunologically by Maxson et al. (1979). Three additional species of the group (*P. aureolus*, *P. teyahalee*, and *P. kentucki*) have since been recognized by Highton (1983) and Highton and MacGregor (1983). In two unpublished studies, Highton (unpublished data) and Peabody (1978) found that *P. glutinosus* and *P. jordani* may be divided, respectively, into 13 and five genetically divergent groups.

Using the same 22 variable proteins as in the other studies of genetic variation in the *P. glutinosus* group (see Highton and MacGregor, 1983, for the techniques and allozymes evaluated), we compared samples of *P. petraeus* from localities 1 and 2 (Fig. 5). These samples were also compared with sympatric *P. glutinosus* and at least one sample from each of the other species and genetically differentiated groups mentioned above.

Heterozygosity estimates for the two populations of *P. petraeus* are 0.004 (locality 1, $n = 20$) and 0.041 (locality 2, $n = 30$). The two *P. petraeus* samples have a genetic distance (Nei, 1972) of 0.04. Most of this divergence is due to variation in two proteins. The faster of two peptidase allelomorphs has a frequency of 0.98 at locality 1 and 0.10 at locality 2, while the slower of two muscle lactate dehydrogenase allelomorphs has a frequency of 0.98 at locality 1 and 0.73 at locality 2. None of the other proteins show significant variation between the two populations of *P. petraeus*.

Plethodon petraeus shows no close genetic relationship to any single other form in the *P. glutinosus* group. Its mean Nei genetic distance to the other species is 0.42, ranging from a low of 0.32 (to a population of white-spotted *P. glutinosus* from Chester County, South Carolina) to a high of 0.52 (to *P. aureolus*). Using a partially different set of 29 variable proteins, Highton and Larson (1979) found that Nei genetic distances ranged from 0.17–0.62 between the six species of the *P. glutinosus* group,

while the distances between these six species and all other species of *Plethodon* were above 0.80. These results confirm the association of *P. petraeus* with the *P. glutinosus* species group and agree with the morphological data. The molecular data will be presented elsewhere.

Acknowledgments.—*Plethodon petraeus* was discovered by AHW and JFJ while they were supported by a Smithsonian Research Opportunities Fund. The electrophoretic analysis and part of the field work were supported by the National Science Foundation (BSR-85-07847 to RH). Computer time was granted by the University of Maryland Computer Science Center. We thank John R. MacGregor, Douglas Stephens, and Linda Hollenberg for contributing to the field work. The Eugene Chandler family generously allowed us access to their land on many occasions. Win Seyle of the Savannah Science Museum (SSM) was helpful in providing information about specimens from the Pettijohn Cave locality. S. Blair Hedges provided the photograph used in Fig. 1. We are also grateful to David E. Carr for sharing his data with us and Nancy Staub for supplying the radiograph of the *Aneides aeneus*. Allan Larson, Roy W. McDiarmid, David B. Wake, and two anonymous reviewers made many helpful comments and suggestions.

LITERATURE CITED

- ADLER, K. 1978. Herpetology in eastern North America during the "naturalists' period" (1725–1850). Pp. 1–17. In K. Adler (Ed.), *Early Herpetological Studies and Surveys in the Eastern United States*. Arno Press, New York Times Book Co., New York.
- BUTTS, C., AND B. GILDERSLEEVE. 1948. Geology and mineral resources of the Paleozoic area in northwest Georgia. *Georgia Geol. Surv. Bull.* 54:1–176.
- HIGHTON, R. 1962. Revision of North American salamanders of the genus *Plethodon*. *Bull. Florida State Mus.* 6:235–367.
- . 1983. A new species of woodland salamander of the *Plethodon glutinosus* group from the southern Appalachian Mountains. *Brimleyana* 9:1–20.
- HIGHTON, R., AND A. LARSON. 1979. The genetic relationships of the salamanders of the genus *Plethodon*. *Syst. Zool.* 28:579–599.
- HIGHTON, R., AND J. R. MACGREGOR. 1983. *Plethodon kentucki* Mittleman: A valid species of Cumberland Plateau woodland salamander. *Herpetologica* 39:189–200.
- KELLY, K. L. 1965. ISCC-NBS Color-Name Charts Illustrated with Centroid Colors (Standard Sample No. 2106). Suppl. to Nat. Bur. Standards Circ. 553. U.S. Government Printing Office, Washington, D.C.
- LARSON, A., D. B. WAKE, L. R. MAXSON, AND R. HIGHTON. 1981. A molecular phylogenetic perspective on the origins of morphological novelties

- in the salamanders of the tribe Plethodontini (Amphibia, Plethodontidae). *Evolution* 35:405-422.
- MAXSON, L. R., R. HIGHTON, AND D. B. WAKE. 1979. Albumin evolution and its phylogenetic implications in the plethodontid salamander genera *Plethodon* and *Ensatina*. *Copeia* 1979:502-508.
- McKNIGHT, K. H. 1977. A note on the ISCC-NBS centroid color charts. *McIlvainea* 3:4-11.
- MOLER, P. E. 1985. A new species of frog (Ranidae: *Rana*) from northwestern Florida. *Copeia* 1985: 379-383.
- NEI, M. 1972. Genetic distance between populations. *Am. Nat.* 106:283-292.
- PEABODY, R. B. 1978. Electrophoretic Analysis of Geographic Variation and Hybridization of Two Appalachian Salamanders, *Plethodon jordani* and *Plethodon glutinosus*. Ph.D. Dissertation, University of Maryland, College Park.
- POPE, C. H. 1950. A statistical and ecological study of the salamander *Plethodon yonahlossee*. *Bull. Chicago Acad. Sci.* 9:79-106.
- RIDGWAY, R. 1886. A Nomenclature of Colors for Naturalists, and Compendium of Useful Knowledge for Ornithologists. Little, Brown, and Company, Boston.
- WAKE, D. B. 1966. Comparative osteology and evolution of the lungless salamanders, family Plethodontidae. *Mem. So. California Acad. Sci.* 4:1-111.

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Dr. RAVEN. Similar examples could be given from other groups of vertebrates and from plants, but the point that they make is that our information isn't complete and that no amount of re-digesting the literature will make it complete or really provide an adequate database on which to operate.

A national biological survey therefore is badly needed to organize in a systematic fashion the information about vertebrates and flowering plants, and going on from there, the problem gets more and more drastic as my colleague, Dr. Lovejoy, has already pointed out.

Lyme disease is probably the most talked about disease in the United States at the present time other than of course, AIDS. Yet, there are probably no more than six or eight people in the United States who could competently identify the tick that spreads Lyme disease from white-tailed mice to human beings. The Center for Ticks and Mites at the Smithsonian Institution, which has the largest and most comprehensive collection in the world and is in itself a database, is funded by the National Institutes of Health. It consists of exactly two people—a curator and an assistant. The funding will be cut off by NIH in September and the Center will then be disbanded. Now, mites, ticks, chiggers, play a extremely important role in the economy of nature, to use an old-fashioned Victorian phrase. If this country can't afford more than six or eight people who are even competent to identify them or to deal with them, we're going to have an extremely difficult time in identifying disease-spreading organisms, agricultural pests, and many others that are essential to the functioning of ecosystems.

The implicit assumption that there are large books available that you could just look in and learn how to do this is simply not warranted. The point that I would like to call your attention to, is that when we talk about six or eight competent individuals, we're talking about six or eight competent to take a number of specimens of mites or ticks and even divide them into piles which represent the different species, much less be able to classify them.

As has been pointed out before, the Soviet Union, China, Europe collectively, Australia, and many other nations have active national biological surveys that are producing comprehensive accounts of the plants, animals and microorganisms of their countries. Hundreds of millions of dollars are being spent annually in the United States on projects which bear to some extent on an understanding of the environment in which they are carried out. Yet our effort to produce environmental impact statements and similar treatments to rationalize our efforts, to note whether what we're doing is good or bad, to understand whether it's driving organisms to extinction or not, all of these efforts depend implicitly on the existence of a national database against which our actions can be judged.

Putting it differently, the Forest Service or the National Park Service have excellent efforts to inventory and to study the biological diversity of the lands that are under their care. They can assess that biological diversity, they can understand the implications of that diversity and their management of it for conservation only if they also take into account the full distributions of those organisms throughout the country, and learn what it means to deal with them locally in a national context.

Not to have a national database in real distinction to all of the other industrialized countries with which we normally deal, is to carry out very large-scale federal actions, very large-scale private actions without a context to house them, without a context in which to judge them.

To get on with this problem and to address the problem will actually result in greater governmental efficiency, in more precise judgments about the effects of environmental actions and particularly, in a greatly enhanced ability to conserve the plants, animals and microorganisms on which our civilization is ultimately based.

In other words, the construction of a National Center with the associated biological survey will both help to preserve our effective leadership role in world conservation and to provide a database that will enrich all of our many scattered and disorganized and uncoordinated efforts in this area. Simply recombining and organizing the data will not do it. A new effort is necessary and I believe that this legislation embodies very well the way that that effort could be carried out, and obviously, I support it fully. Thank you.

[The prepared statement with attachments, of Dr. Raven follows:]

STATEMENT OF
 PETER H. RAVEN, DIRECTOR
 MISSOURI BOTANICAL GARDEN
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On behalf of the Association of Systematics Collections and the
 American Institute of Biological Sciences

Before the
 Subcommittee on Natural Resources,
 Agricultural Research and Environment
 Committee on Science, Space, and Technology
 United States House of Representatives

Concerning H.R. 4335
"National Biological Diversity Conservation
 and Environmental Research Act"

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

I appreciate very much the opportunity to appear before you and to comment on aspects of this important legislation. I speak today for two organizations that together represent a majority of our nation's institutions and individuals who study biological diversity. The Association of Systematics Collections represents the natural history museums and botanical gardens in North America. Among its 80 institutional members are the Smithsonian Institution, the state Biological Surveys and museums including New York and North Carolina, free-standing institutions such as the Missouri Botanical Garden and New York's American Museum of Natural History, agricultural research centers, and university museums such as those at Harvard, North Carolina, Michigan, and UC California. ASC has 20 affiliate societies including the American Ornithological Society and the Entomological Society of America. ASC's book, Foundations for a National Biological Survey, brought attention to many of the issues raised in HR 4335.

The American Institute of Biological Sciences is a non-profit, science and education organization of over 40 member associations, representing more than 70,000 life scientists. AIBS was chartered in 1947 as part of the National Academy of Sciences and became an independent organization in 1955. AIBS is dedicated to the advancement of the biological sciences and their applications to human welfare and to fostering and encouraging research and education in the biological sciences. The theme of the 1988 AIBS Annual Meeting is Biological Diversity.

The members of ASC and AIBS commend you for your concern about the loss of biological diversity and the insufficient effort of the United States to inventory its natural resources. We do in fact lack a national policy on biological diversity. Developing such a policy, so that our overall effort might be more efficient and comprehensive, is a key to preserving our national heritage of plants, animals, and microorganisms for future generations of Americans to enjoy, study, and utilize for their benefit. Although it is sometimes asserted that the problem addressed by this legislation is under control, such is far from the case. What we have instead is a series of ad hoc principles that only partly provide the means to accomplish our national objectives.

The United States historically has been a world leader in the field of biological conservation. For example, our Endangered Species Act has served as a model for many other countries and our leadership in the CITES (Convention on Trade in Endangered Species) convention was an essential element in its adoption. Notwithstanding this fine record, we have fallen far behind many other nations in our understanding of our own biota, and in the means by which we make available knowledge concerning it. Even though we as a nation spend hundreds of millions of dollars annually on environmental impact statements, on the management of biological diversity in parks, national forests, and other public lands, and on the conservation of particular habitats, such as wetlands, we pay only limited attention to most of the organisms that actually inhabit such areas, and have only limited means to study them and to make their characteristics and geographical ranges available.

In contrast, the Soviet Union has completed a comprehensive account of its plants, as have Japan, China, and Europe collectively --- despite the extensive difficulties of effective international cooperation in the diverse area between the Urals and the Atlantic. A decade ago Australia launched a biological survey, funded nationally; the survey is playing a vital role in the understanding and utilization of the plants, animals, and microorganisms of that continent. China has completed three-quarters of a national flora --- an account of its plants --- and will bring this 120-volume, encyclopedic work to completion within a few years. In Japan, the Soviet Union, Australia, and other countries, national accounts of the organisms of various groups are regarded as an important aspect of national economic development, and are pursued actively by the respective governments.

Paradoxically, our tradition in the United States is different. Here we are content to leave these functions to miscellaneous federal departments and to the private sector; in doing so, we simply assume that the knowledge on which we base our actions is indeed available somewhere---but where is it? When we

deliberate about whether it is desirable to build a dam on the east slope of the Rocky Mountains in Colorado, or to drain a swamp on the Coastal Plain of Virginia, we implicitly act as if we knew everything that is necessary about the organisms that inhabit the area. Sometimes we undertake local studies in the course of our evaluation, but we inevitably assume that we understand enough about the overall distributions and characteristics of the organisms that occur locally to evaluate responsibly the results of our actions on a regional and national basis.

Notwithstanding our faith in the way our system operates, the truth is very different. For some reason we are willing to spend a great deal of money, and invest a great deal of time and effort, in considering how to manage biological diversity in the national parks and the national forests; but we do not address the central problem of managing the data about our plants, our animals, and our microorganisms overall. By not providing such a context, we are denying ourselves the ability to carry out our conservation and natural resource management actions effectively, and wasting a great deal of money in attempting to achieve our objectives in these areas.

What are the dimensions of the biological diversity of the United States? Within the borders of the 48 contiguous states there are approximately 20,000 species of plants and probably well over 300,000 kinds of organisms overall---vertebrates, insects, mites, fungi, microorganisms of various kinds. We do not often think about most of these groups of organisms, basing our actions in conservation mostly on a few well-known species of vertebrates and plants; nonetheless, many member of the lesser-known and neglected groups are of vital importance to our welfare. Included are agricultural pests, insects that pollinate our crops, diseases that ravage the major trees that make up our woodlands---a vast array of mostly little-known kinds of organisms that we really do not appreciate at all.

Our ignorance of this area was discussed well by James H. Oliver, Jr., in a policy forum article in the journal *SCIENCE* for May 20, 1988. He pointed out that millions of dollars can be saved in some instances by knowing what species to target for control in biological and agricultural systems, and instanced the difficulties in understanding species of great economic importance such as the tick vector for Lyme disease and the Asian tiger mosquito when they first appeared. Identification services for insects and other arthropods of medical, veterinary, and agricultural importance are declining rapidly, and competent specialists are simply not available for many groups of organisms. Only a few individuals in the U.S. are actively concerned with insects such as fleas, mosquitoes, ticks, and others of great economic importance, and a handful with the classification and identification of the fungi that cause billions of dollars of damage annually to our crops. Funding sources for research and

training in systematic biology in the U.S. need to be improved greatly for our economic benefit, and certainly to allow us to take responsible actions in the area of conservation. HR 4335 will address this problem by establishing the National Center for Biological Diversity, which will set a national agenda, and provide the context in which research and education in systematics and ecology will be seen as vital to our national purposes.

The lack of knowledge, funding, and expertise is not confined to insect pests and disease vectors. For example, in the 1960s, many of us worked hard to organize a national flora: a computerized data base about the plants of the U.S., and a book describing them. It may surprise you to learn that no such book, much less any such data base, exists. There are of course individual books about the plants of most states and many regions within states, but no overall integration of the information in them, no standard system of naming them, and many difficulties in bringing the information together. It is against this background that the individual states and several federal agencies are attempting to conserve our native plants, which are so obviously valuable to us aesthetically, ecologically, and commercially---as potential sources of medicine, oils, fats, waxes, and biomass, for example, in addition to the traditional uses.

Organizations and political bodies charged with the task of conserving these plants prefer to assume that all the knowledge is available, and can simply be made available at no cost by "those who have the information," by "volunteers," or by other bodies who are not provided adequate funds to do their work. We need to break through this "know-everything" approach to information about our rich biological assets, and to do away with the illusion that we can intelligently manipulate organisms as we wish without increasing the fund of knowledge on which responsible action might be based. We must, in order to rationalize our efforts, get on with the important national task of finding out what is really here, and how we can best deal with it. The national flora we attempted to launch nearly 25 years ago is just underway now, but the flora of Europe was completed 20 years ago. During this period of time, we have invested hundreds of millions of dollars in assessing environmental impacts, conserving species, combatting weeds and other pests, --- but without ever pausing to try to appreciate the whole national picture. In other words, we have not been willing to spend a few million dollars annually to provide a rational context within which these actions could have based. For example, the Flora of North America Project will spend about \$1 million per year to produce one volume each year, excluding the cost of computer-networking the data, and with many institutions absorbing the salary costs of the key personnel.

To speak about using primarily volunteers to monitor biological diversity, when we as a nation do not even have specialists competent to identify most groups of organisms, is

simply self-deception. For federal agencies to spend hundreds of millions of dollars annually in land management without even trying to appreciate the insects, fungi, nematodes, and other organisms that determine the way in which natural communities function is a tragic waste. If the agencies involved have a genuine interest in improving the ways in which we address these problems, they will support the concept of a National Center for Biological Diversity and Environmental Research, to focus the effort to study, classify, and understand organisms and the interrelationships between them.

"Biological diversity" is a concept that can be approached properly only if we are willing to invest in studying organisms, and no amount of discussion about how much we want to preserve it will alleviate the necessity of basing our actions in this area on adequate scientific knowledge. We can either continue to talk about the inadequacy of scientific knowledge in this area, or we can, along with most other nations, address the development of such knowledge as an important national goal.

A National Center for Biological Diversity and Environmental Research would provide a means for addressing this problem directly. Probably most appropriately located in the Smithsonian Institution, which has the national collections of all groups of organisms, such a center would have the capability of generating a national biological survey, and thus of generating the knowledge on which well-informed actions could be taken. By providing a data base about the more than 300,000 species of organisms that live within the borders of the 48 contiguous states, not to mention the high biotic diversity of Hawaii, Alaska, and Puerto Rico, such a center could provide the documentation necessary for effective private and public action in conservation, natural resource use, and land-use planning. A dedicated funding base for the Center, allowing for funded collaboration in realizing its objectives by other museums, universities, conservation groups, and interested parties, would allow the development of this information to become a truly national project, as is currently the case in China, the Soviet Union, Australia, and most other countries. Far from duplicating existing efforts, this Center would help to unify their scattered activities into an effort that would really provide a sound basis for national action. To envision this center as a political entity, rather than a research-based one, is to misunderstand seriously the intention of the legislation.

A national advisory board for the center, including representatives of museums, universities, conservation groups, and perhaps users of natural products such as the drug industry or agricultural professionals, would set priorities. The board could identify groups of organisms for which specialists are not currently available, and take steps to train and secure their long-term employment in the national interest. The center could

generate accounts of the plants, animals, and microorganisms of the U.S., and construct and maintain networks of data banks about these organisms that could be queried for various purposes. It could collaborate effectively with the similar efforts that are underway throughout the world. For example, the Soviet Union, Canada, and the U.S. could collaborate in a truly comprehensive evaluation of the plants, animals, and microorganisms of the northern portions of the world, with great mutual benefit. For \$8-10 million per annum, the Center could run 2-3 projects similar to the Flora of North America project, fund several small regional projects, and provide leadership for a truly comprehensive national data base, as well as leveraging additional funds by drawing attention to the importance of the effort.

Some of the testimony provided to your subcommittee in early June, 1988, has, I believe, been based on two misconceptions. One is the mistaken belief, that enough information is already available: all that we need to do is to bring it out and apply it in specific cases. No one who has seriously studied any groups of organisms would agree with that assertion; it is a comfortable one, allowing "action" to be taken now, without at the same time increasing the knowledge on which that action should be taken, but it is patently and seriously incorrect. Even in relatively well-known groups of organisms, such as plants and vertebrates, new species are being discovered every year within the limits of the continental U.S. The distributions of even the best-known organisms are changing due to habitat alternation such that it is difficult for anyone to keep track of them, giving the inadequate funding we are willing to provide for maintaining this base of knowledge.

I should also emphasize that museum specimen-based research and the resultant data bases are the essential information needed to manage our environmental resources. Only with voucher specimens can the authenticity of results be documented for future generations. Museum specimen records and their computerized label information are used to compare what plants and animals lived in a particular place 100 or 200 years ago with what exists today. Active field work is also a part of the process. No books can do this job. A recent article, "Systematics, Natural History, and Conservation" published in AIBS' journal BioScience makes these points and is appended to this testimony.

I would suggest that the second misconception inherent in the negative comments that have been offered on this legislation is that there is already a national policy on biodiversity. For some reason, federal agencies and other institutions commenting on this legislation, active as they are in the field of protection of biological diversity, project the feeling that they believe that their action in this area supersedes either the need for a national policy, or for improving the base of knowledge on which responsible action could rest. I fail to see why such a

conclusion follows, but perhaps I am simply missing the point. Parks and national forests are wonderful, and when properly managed, they provide an excellent means for the preservation of biological diversity. What is not obvious is why such preservation is better carried out without the increased information that would be brought to bear by the implementation of a national biological survey though the development of a National Center for Biological Diversity and Environmental Research, or why it is better in the absence of a national policy on biological diversity. In the same sense, the establishment of BLM Natural Areas and Research Natural Areas is an excellent strategy for the preservation of biological diversity within our borders, but it is difficult for me to see why such selection either makes unnecessary or can be carried out more effectively in the absence of an appropriate data base. To assert that everything that can be done, is being done, is simply to exhibit a lack of understanding about how much we have to learn about the organisms that inhabit this country.

Likewise, it is absolutely wonderful for organizations to develop conservation-oriented data bases by reading the available literature on the plants and animals of the U.S.; but it would be far better if scientists could develop comprehensive information about all groups of organisms that compose our natural resources, and have the support that would allow them to arrange it rationally for ready access, and provide a data base of which we could, as a nation, be justifiably proud.

In my opinion, a failure to capitalize on such opportunities amounts to a tragic waste of national abilities, and of national potential for improving the effectiveness of our actions. No amount of testimony about the importance of what is being done by individual agencies can logically lessen the importance of what is proposed in this legislation. No federal agency is now charged with dealing with biological diversity in the manner proposed for the Center for Biological Diversity and Environmental Research, although many are carrying out activities that should logically depend on the sound development of scientific knowledge in this area. No state agency or private organization can have the public mandate and responsibility to do the job. Far from fragmenting our national effort, the proposed legislation would help to unify it and to provide, for the first time, an appropriate conceptual base for the currently fragmented programs in this area. Our choice is whether we will continue to operate on intuition and the available fragmented knowledge, or really begin to take the problem seriously.

A special word is necessary concerning the National Science Foundation. This agency has been the major funding source for studies on biological diversity since its establishment more than 40 years ago. In my opinion, the NSF should be fully represented in any committees established under the proposed legislation, and

its officials and advisors should play a major role in determining the structure and conduct of the national biological survey. In line with the major objective of the NSF, which is to maintain the health of the U.S. scientific community, it would be expected to continue to make a significant number of grants in the area of biological diversity and biological conservation. In addition, it is expected that the NSF, through its Biological Research Resource Program, would continue to support the maintenance and proper functioning of the biological collections on which the products enumerated in this testimony depend. NSF is primarily a granting agency and not a research organization. For that reason, the Smithsonian Institution seems to me to be the appropriate location for the National Center proposed in this legislation. Grants, or perhaps better, contracts, made directly from the center would in my opinion be for the performance of specific survey tasks, computer networking, or for the improvement of our national capabilities in particular areas of biological systematics and data management (including the advanced training of students) either within or outside of the Smithsonian itself. I can therefore foresee no potential conflict between the operation of the center and that of the NSF, but I do believe that the NSF should be represented in all bodies that may be established under this legislation, as I have outlined above.

Should the Center be established in the Smithsonian, its location within that institution needs to be established clearly, as does the exact nature and composition of its advisory board. At any rate, the choice is ours. We can simply continue spending hundreds of millions of dollars annually on our currently fragmented efforts to manage and preserve biological diversity, without going to the trouble of enhancing the data base on which these actions implicitly depend; or we can decide to act responsibly, allocating far less than 1% of the total funds expended in this area to creating a context in which we can make improved decisions that will be much more effective in attaining the goals that we have set for ourselves.

Thank you for this opportunity to present this information. I would be pleased to answer any questions.

Systematics, Natural History, and Conservation

Field biologists must fight a public-image problem

Harry W. Greene and Jonathan B. Losos

Field biology has a public-image problem at a time when conservation desperately needs the expertise of systematists and natural historians. Recent anecdotes illustrate this irony.

- The leader of a well-known environmental group visited a research station in Costa Rica and asked pointedly, "When are you scientists going to start doing something for conservation?"

- Animal rights advocates in the San Francisco Bay Area demanded that the University of California prohibit all animal research not directly related to human welfare, and they objected specifically to studies aimed at clarifying the biological species status of certain songbirds.

- An employee of a major zoological park congratulated one of us (H. W. G.) on working with animals in the wild, "unlike most herpetologists, who just kill them and count scales."

Even some laboratory biologists view field research as simply an intellectual exercise and ask, "What good does it do?"

Academic scientists long have been involved in traditional conservation

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The importance of systematics and natural history for conservation lies in defining the boundaries of organismic diversity

activities (e.g., Janzen 1986a, Stebbins and Cohen 1976), but the above vignettes are symptomatic of widespread misunderstanding of field biology among lay people, environmentalists, and even biologists. This article is intended to summarize some important roles of systematics and natural history in the preservation of organismic diversity, suggest ways those roles can be enhanced, and promote their discussion in classes, public lectures, governmental agencies, and conservation organizations.

Roles of systematics and natural history

Systematics encompasses the characteristics, genetic status, and evolutionary history of organisms. Once simply the description of obvious phenotypic variation and the application of formal names, systematics now uses a variety of biochemical, multivariate statistical, and other sophisticated approaches in explicit analytical frameworks (e.g., Gould and Woodruff 1986, Wake and Yanev 1986). Natural history focuses on where organisms are and what they do in their environ-

ments, including interactions with other organisms. It encompasses changes in internal states insofar as they pertain to what organisms do (e.g., chronologies of reproductive events; Bartholomew 1986, Greene 1986).

Given increasingly limited resources, society must carefully articulate the reasons for conserving nature, decide which places and species to protect, and determine how to accomplish these goals. Much has been written on why we should preserve species (e.g., Ehrlich and Ehrlich 1981), but recognition of the necessity for choosing among species and potential refuges for preservation is a recent phenomenon (Conway 1980, Lovejoy 1980). Such difficult choices require an evaluation of sites and taxa, and necessarily will involve a "principle of relative replaceability" (Colwell in press); distinctive and unique landscapes, biotas, and evolutionary lineages have greatest value. The importance of systematics and natural history for conservation thus lies in defining the boundaries and contours of organismic diversity.

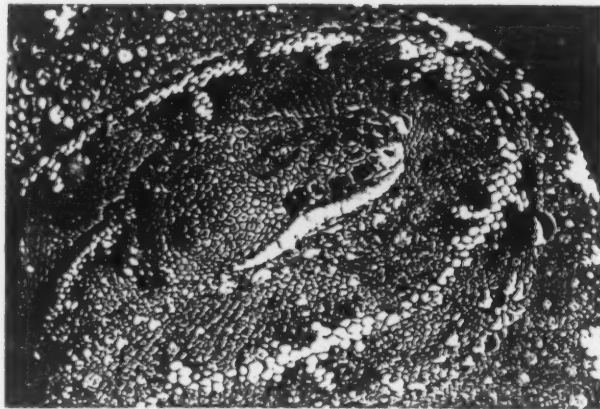
The nature and geography of genetic and phenotypic variation. The emergence of biochemical systematic techniques has disclosed that genetically distinct units are not always recognizable on the basis of traditional external characteristics. The North American leopard frog, long used for laboratory research, is an impressive example. What is called *Rana pipiens* in hundreds of papers actually comprises at least 20 species, some of them with highly restricted distributions

(Hillis et al. 1983). Furthermore, there is not always a single entity, "the species," in nature. Instead, there may be reproductive continuity among populations over broad areas, varying levels of hybridization and introgression within reproductively connected populations, or complete isolation of adjacent gene pools (Wake and Yanev 1986). Because a major goal of conservation is to preserve both genetic and phenotypic diversity, comprehensive, modern studies of local and geographic variation must be included in the identification of "least replaceable" biological entities at various taxonomic levels.

Detailed comparisons among living and fossil organisms are the only basis available for inferences about their origins and relationships. It is because of phylogenetic systematics that we can place special value on the coelacanth, the tuatara, and other "living fossils," and that we hypothesize that chimpanzees, not gorillas, are our closest relatives (e.g., Goodman et al. 1983). Such analyses indicate that armadillos, sloths, and anteaters are not only a small group of strange animals, but also that they are one another's closest relatives (the Xenarthra) and among the few survivors of one lineage of the earliest divergence event in the history of placental mammals (Novacek 1986).

In addition to the problem of unrecognized genetic diversity, it is not widely appreciated that even the best known parts of the earth still hold undiscovered organisms. Herpetologists have explored California in great detail for more than a century, yet they continue to uncover new amphibians and reptiles (Table 1). Recent field studies in arid regions have disclosed populations of three salamanders, a toad, an alligator lizard, and a garter snake that are distinctive and new to science.¹

Such discoveries are often not merely minor variants of known organisms, but dramatically different. Just over a decade ago, in a desert canyon, scientists discovered *Batrachoseps camp*, the largest and morphologically most primitive living species in a well-known genus of common Cali-



What good does it do to study snakes? This emerald tree boa, *Corallus caninus*, is a 1.5-meter-long snake endemic to South American lowland tropical rain forests. Photo: H. W. Greene.

fornia salamanders (Marlow et al. 1979). In the early 1970s, a third species of living peccary was discovered in the Chaco region of Paraguay, more different from the two known species than they are from each other (Wetzel et al. 1975). The proportions of tropical biotas that are still undescribed are, of course, far larger than in temperate regions, and the need for understanding them is especially urgent (Wilson 1984).

Research museum specimens, the core of systematic biology, provide documentation for systematic conclusions and future analyses; both are necessary because conservation often resolves to political, legal, and economic confrontations (e.g., Dodd 1982, Gallaway et al. 1985). Given the ongoing environmental changes now occurring globally, repeated sampling is also imperative to assess short-term changes (e.g., the effects of DDT

on bird eggshells were first detected with museum specimens; Foster 1982). Ideally, specimens (including tissues and other nontraditional material) would represent geographic and recent temporal variation in all taxa. That goal will never be possible for most species, because of the general difficulty in obtaining specimens and the inadvisability of doing so in the case of genuinely rare forms. These factors make adequate representation of common, easily studied taxa all the more important.

How organisms interact with the environment and each other. The information implicit in Joseph Grinnell's concept of an ecological niche, that "range of values of environmental factors that are necessary and sufficient to allow a species to carry out its life history" (James et al. 1984), will always be crucial to the management

Table 1. Numbers of amphibian and reptilian taxa in three summaries of California herpetology, based on Stebbins (1954, 1966, 1985). A frog and a turtle, recently introduced, are not included in the 1985 counts.

Taxa	1954	1966	1985
Frogs	16	20	22
Salamanders	17	18	* 24
Turtles	4	4	4
Lizards	32	34	36
Snakes	32	33	35
Totals	101	109	121

¹T. J. Papenfuss, 1988. Personal communication. Museum of Vertebrate Zoology, University of California, Berkeley.

of wild and captive animals, as well as to assess ecological divergence as a measure of relative replaceability. Ideally, we need to characterize in detail the geography of organism-environment interactions for each species of interest (Grinnell 1917), so that predictions can be made about unstudied sites.

Although detailed ecological and behavioral inventories are impossible for many species because of their rarity and the difficulty of study as well as the sheer magnitude of the task, often extrapolation from a few investigations is useful. Jaguars (*Panthera onca*) occurred within historic times from the southern United States to temperate South America, but they are now extinct in some areas and so rare as to be essentially unstudiable in many others. However, four projects in divergent habitats show that certain generalities characterize their ecology: these cats typically are associated with watercourses, even in xeric regions, and their diet is always both broad and focused on a few especially common, moderately large, prey species (Table 2).

Areas to be saved. After more than a decade of debate, it is clear that no simple relationship between area, species richness, and endemism can guide the design of refuges (Soulé and Simberloff 1986, Zimmerman and Bierregaard 1986). Criteria for establishing refuges must vary with goals and local circumstances, but systematics and natural history provide crucial raw data on the geography and underlying mechanisms of species richness. Those disciplines delimit areas and components of high endemism (Prance 1982) and point to critical ecosystem factors (e.g., "keystone mutualists," Gilbert 1980, Terborgh 1986; inclusion of peccary wallows as breeding ponds for certain frogs, Zimmerman and Bierregaard 1986). They thereby define potential gains and losses in alternative conservation strategies.

How organisms should be managed. The importance of systematics and natural history in effective captive maintenance is obvious (e.g., Kleiman et al. 1986, Murphy and Collins 1980), and these disciplines also help zoos define critical taxa on which to focus scarce resources. Potential ge-

netic compatibility must be assessed for management of captive populations and reintroduction programs to avoid the deleterious effects of inbreeding depression (Ralls and Ballou 1983), outbreeding depression (Templeton et al. 1986), and production of ecologically inappropriate phenotypes. For example, when ibex from Sinai and Turkey were introduced to Czechoslovakia, they gave birth in winter; then introgression from local stock led to hybrids that also bred out of season, and the entire population perished (Greig 1979).

Why and how nature should be appreciated. For conservation to succeed, wild organisms and places must have value in human society. The myriad interactions among plants and animals hold countless examples of novel solutions to problems with analogues in human welfare (Colwell in press, Ehrlich and Ehrlich 1981, Wilson 1984). Field biology can enhance those values, and their cultural acceptance, in that knowledge exposes the practical applications and inspires esthetic rewards. Indeed, since ethno-biological research incorporates systematics and natural history (e.g., Patton et al. 1982), those disciplines also can assist the transfer and evaluation of cultural knowledge among human societies.

Television nature programs are increasingly popular, and a visit to any major bookstore confirms the enormous public demand for field guides and books about wilderness. The information sought focuses on identification and the interactions among free-living organisms and environments, all of it based on field biology. A nature tourist's questions about garter snakes at a pond in California can be answered with more accuracy today because herpetologists continue to struggle with this difficult group (Stebbins 1954, 1966, 1985). Examples of convergent evolution, such as gliding adaptations in diverse reptiles and mammals, are widely used in environmental education. Usually left unstated is the fact that we could not marvel at the striking resemblances of unrelated organisms from distant, similar environments without phylogenetic evidence that the similar traits were indeed independently acquired (Luke 1986).

The future: What's needed now?

Three widespread fallacies downplay the importance of field biology. The first is that field guides and other popular nature books are miraculous gifts to humanity; a corollary is that television nature programs convey information gained fresh by the narrator, or perhaps the filmmaker. The second fallacy is that we now know everything about nature that will be necessary to save it; less extreme versions are that we do not require precise information in cases where it is lacking, or that this information can be gained on short notice. The third, perhaps most cherished, fallacy is that we can still devote ourselves primarily to ideals of pristine ecosystems. Conservation then would be simply a matter of buying large tracts of land, and there would be no need for extensive knowledge and management.

The realities are stark and unambiguous. However far back one could talk of pristine ecosystems—a century or several millennia—it was long enough ago to be of limited relevance today (Martin and Klein 1984). A global extinction crisis is fast upon us, the impact continues to accelerate in many quarters—especially in the richest and most fragile ecosystems, and the solutions must be largely in place within our lifetimes. Even the world's largest parks are inevitably embedded in adjacent human cultures and will require active management (e.g., Carr 1988, Chase 1986, Janzen 1986b). Unfortunately, we still know little about the lives of many large, popular vertebrates in those reserves, and we know nothing about most species of small animals beyond their existence. The political forces opposing conservation are powerful and clever, and, despite our ignorance, the best possible data must be used to counter them. Tellico Dam was not delayed for years because of some casual observer's intuition that a small, nondescript, snail-eating fish *might* be new to science and endangered by its construction. Instead, careful studies on a taxonomically difficult group disclosed that a new and unusual species of darter inhabited the Little Tennessee River.

Unfortunately, systematics and natural history are misunderstood, and

Table 2. Geographic variation in habitat and diet of jaguars, *Panthera onca*, based on detailed studies at four sites. Percent occurrence and total number of items in diet samples in parentheses.

Location	Habitat	Diet	Reference
Pantanal, Brazil	Swamp, gallery forest, savanna	Various vertebrates, but predominantly one species of large rodent	Schaller and Vasconcelos (1978)
Manu, Peru	Seasonally flooded primary rain forest	Various vertebrates, but turtles and caimans were prominent items (33%, N = 40)	Emmons (1987)
La Selva, Costa Rica	Primary rain forest	Various vertebrates, but sloths (46%) and green iguanas predominated (N = 59)	H. W. Greene, H. E. Braker, and M. A. Santana (unpublished data)
Cocksomb, Belize	Secondary rain forest	Various vertebrates, but armadillos predominated (54%, N = 185)	Rabinowitz and Nottingham (1986)

their progress impeded at the very time when they should play a crucial role in global conservation. Species are literally going extinct before they can be formally described, let alone studied and legally protected (Wilson 1984). What we know about nature represents the accumulation of decades of painstaking research by thousands of people with diverse expertise. The missing information will come much harder, yet the task is increasingly burdened with bureaucracy. Field biologists now must fill out mountains of redundant paperwork, try to persuade institutional animal-use committees that accurate information is important, and pay fees to wait months for research permits that may never materialize. Ironically, the discovery of new species often underscores areas that need special protection (e.g., the Chaco peccary and its habitat), whereas the negative impact of research on most wild populations is trivial compared with that of human greed, technology, and population growth. Of the almost 62 million bird deaths annually from human-related causes in the United States, 61.5% result from hunting, 32% result from collisions with manmade objects, and only 0.01% are from scientific collecting (Banks 1979).

We need broader understanding by society of the obligate roles of field biology in environmental appreciation, education, and conservation. Gratuitous, divisive polemics from other environmentalists (as in the anecdotes described early in this article) waste time and energy that could be devoted to solving serious problems. Opposition from animal-rights groups emphasizes the lives of a few individual animals, rather than the

health of populations; without consideration of the benefits of research and provision of alternatives, that opposition amounts to fiddling while the biosphere burns. Governmental controls on field biology should be streamlined to avoid redundant paperwork and actively encourage responsible research. A good yardstick would be, "Is this legislation's overall effect on nature conservation positive?"

Given the magnitude and urgency of nature conservation problems, governmental funding for basic research in systematics and natural history is pitifully inadequate (Ehrlich 1986, Wilson 1985). Massive increases in financial support for field biology are needed, as is appreciation by funding agencies of the connections between basic biology and conservation. Training of new systematists throughout the world is especially important (Foster 1983, Wilson 1985). In this regard it is heartening that the National Science Foundation is considering formal support for such interactions (Anonymous 1987).

The problem, of course, is partly of our own making. Many field biologists derive immense personal satisfaction from the activity itself, and, therefore, some see little need to communicate formally with lay people. Even textbooks written by organismal biologists rarely discuss systematics as a modern scientific discipline, let alone its relationship to broader societal issues. Cinematographers and journalists routinely rely upon scientists for information and direct assistance but, beyond listing names in the credits, the underlying research activities usually are not reflected in the final public product.

Field biologists, especially those with talents for communication, can seek opportunities to explain the methods and ramifications of systematics and natural history. We should include implications for conservation and management in primary research papers, write popular articles, talk with visitors at study sites, interact with local agencies, explain our research to undergraduates, and insist that the media integrate the role of scientific studies in their reports. Educators should treat systematics and natural history as important, modern disciplines—if monoclonal antibodies deserve a special, explanatory box in textbooks, so do museum curation techniques and cladistics. Farmers, bankers, and biochemists cannot be expected to appreciate automatically the roles of systematics and natural history in society. If we do not take an active part in educating the public, who will?

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References cited

- Anonymous. 1987. *Conserv. Biol.* 1: 94.
- Banks, R. C. 1979. Human related mortality of birds in the United States. *US Department of Interior, Fish and Wildlife Service Special Science Report—Wildlife* (215), Washington, DC.

- Bartholomew, G. A. 1986. The role of natural history in contemporary biology. *BioScience* 36: 324-329.
- Carr, A., III. 1988. Beyond parks. *Anim. Kingdom* 91(2): 12-25.
- Chase, A. 1986. *Playing God in Yellowstone*. The Atlantic Monthly Press, Boston.
- Colwell, R. K. In press. Natural and unnatural history: biological diversity and genetic engineering. In *Freedom and Responsibility: Moral Issues Facing Scientists Today*. Swiss Scientific Academy, Gerzensee, Switzerland.
- Conway, W. G. 1980. Where do we go from here? *Int. Zoo Yearb.* 20: 184-189.
- Dodd, C. K., Jr. 1982. A controversy surrounding an endangered species listing: the case of the Illinois mud turtle. *Smithson. Herpetol. Inf. Serv.* 55: 1-22.
- Ehrlich, P. 1986. *The Machinery of Nature*. Simon and Schuster, New York.
- Ehrlich, P., and A. Ehrlich. 1981. *Extinction: The Causes and Consequences of the Disappearance of Species*. Random House, New York.
- Emmons, L. H. 1987. Comparative feeding ecology of felids in a neotropical rainforest. *Behav. Ecol. Sociobiol.* 20: 271-283.
- Foster, M. S. 1982. The research natural history museum: pertinent or passe? *Biologist* 64: 1-12.
- . 1983. Training biologists and resource managers in lesser developed countries. *Interciencia* 8: 289-293.
- Galloway, B. J., J. W. Bickham, and M. D. Springer. 1985. A controversy surrounding an endangered species listing: the case of the Illinois mud turtle, another perspective. *Smithson. Herpetol. Inf. Serv.* 64: 1-17.
- Gilbert, L. E. 1980. Food web organization and conservation of neotropical diversity. Pages 11-33 in M. E. Soulé, ed. *Conservation Biology: An Evolutionary-Ecological Approach*. Sinauer Associates, Sunderland, MA.
- Goodman, M., G. Braunitzer, A. Strangel, and B. Shrank. 1983. Evidence of human origins from haemoglobins. *Nature* 303: 546-548.
- Gould, S. J., and D. S. Woodruff. 1986. Evolution and systematics of *Cerion* (Mollusca: Pulmonata) on New Providence Island: a radical revision. *Bull. Am. Mus. Nat. Hist.* 182: 389-490.
- Greene, H. W. 1986. Natural history and evolutionary biology. Pages 99-108 in M. E. Feder and G. V. Lauder, eds. *Predator-Prey Relationships: Perspectives and Approaches from the Study of Lower Vertebrates*. University of Chicago Press, Chicago.
- Greig, J. C. 1979. Principles of genetic conservation in relation to wildlife management in Southern Africa. *Afr. J. Wildl. Res.* 9: 57-78.
- Grinnell, J. 1917. The niche-relationships of the California thrasher. *Auk* 34: 427-433.
- Hillis, D. M., J. S. Frost, and D. A. Wright. 1983. Phylogeny and biogeography of the *Rana pipiens* complex: a biochemical evaluation. *Syst. Zool.* 32: 132-143.
- James, F. C., R. F. Johnston, N. O. Warner, G. J. Niemi, and W. J. Boecklin. 1984. The Grinnellian niche of the wood thrush. *Am. Nat.* 124: 17-30.
- Janzen, D. H. 1986a. *Guinacaste National Park: Tropical Ecology and Cultural Restoration*. Editorial Universidad Estatal a Distancia, San Jose, Costa Rica.
- . 1986b. The eternal external threat. Pages 286-303 in M. E. Soulé, ed. *Conservation Biology: The Science of Scarcity and Diversity*. Sinauer Associates, Sunderland, MA.
- Kleiman, D. G., B. B. Beck, J. M. Dietz, L. A. Dietz, J. D. Ballou, and A. F. Coimbra-Filho. 1986. Conservation program for the golden lion tamarin: captive research and management, ecological studies, educational strategies, and reintroduction. Pages 959-979 in K. Benirschke, ed. *Primates: The Road to Self-Sustaining Populations*. Springer-Verlag, New York.
- Lovejoy, T. E. 1980. Tomorrow's ark: by invitation only. *Int. Zoo Yearb.* 20: 181-183.
- Luke, C. 1986. Convergent evolution of lizard toe fringes. *Biol. J. Linnean Soc.* 16: 1-16.
- Marlow, R. W., D. B. Wake, and J. M. Brode. 1979. A new salamander, genus *Batrachoseps*, from the Inyo Mountains of California, with a discussion of relationships in the genus. *Nat. Hist. Mus. Los Angeles County Sci. Bull.* 308: 1-17.
- Martin, P. S., and R. G. Klein, eds. 1984. *Quaternary Extinctions*. University of Arizona Press, Tucson.
- Murphy, J. B., and J. T. Collins, eds. 1980. *Reproductive biology and diseases of captive reptiles*. Society for the Study of Amphibians and Reptiles, Oxford, OH.
- Novacek, M. J. 1986. The skull of lepidid insectivores and the higher-level classification of eutherian mammals. *Bull. Am. Mus. Nat. Hist.* 183: 1-111.
- Paton, J. L., B. Berlin, and E. A. Berlin. 1982. Aboriginal perspectives of a mammal community in Amazonian Peru: knowledge and utilization patterns among the Aguaruna Jivaro. *Spec. Publ. Pyramizing Lab. Ecol.* 6: 111-128.
- Prance, G. T., ed. 1982. *Biological Diversification in the Tropics*. Columbia University Press, New York.
- Rabinowitz, A., and B. G. Northingham, Jr. 1986. Ecology and behavior of the jaguar (*Panthera onca*) in Belize, Central America. *J. Zool.* 210: 149-159.
- Ralls, K., and J. Ballou. 1983. Extinction: lessons from zoos. Pages 164-184 in C. M. Schonewald-Cox, S. M. Chambers, B. MacBryde, and W. L. Thomas, eds. *Genetics and Conservation*. Benjamin-Cummings Publ., Menlo Park, CA.
- Schaller, G. B., and J. M. C. Vasconcelos. 1978. Jaguar predation on capybara. *Z. Säugetierkd.* 43: 296-301.
- Soulé, M. E., and D. Simberloff. 1986. What do genetics and ecology tell us about the design of nature reserves? *Biol. Conserv.* 35: 19-40.
- Stebbins, R. C. 1954. *Amphibians and Reptiles of Western North America*. McGraw-Hill Book Co., New York.
- . 1966. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin, Boston.
- . 1985. *A Field Guide to Western Reptiles and Amphibians*. 2nd ed., revised. Houghton Mifflin, Boston.
- Stebbins, R. C., and N. W. Cohen. 1976. Off-road menace. *Sierra Club Bull.* (July/August): 1-4.
- Templeton, A. R., H. Hemmer, G. Mace, U. S. Seal, W. M. Shields, and D. S. Woodruff. 1986. Local adaptation, coadaptation, and population boundaries. *Zoo Biol.* 5: 115-125.
- Terborgh, J. 1986. Keystone plant resources in a tropical forest. Pages 330-344 in M. E. Soulé, ed. *Conservation Biology: The Science of Scarcity and Diversity*. Sinauer Associates, Sunderland, MA.
- Wake, D. B., and K. P. Yaney. 1986. Geographic variation in allozymes in a "ring species," the plethodontid salamander *Ensatina eschscholtzii* of western North America. *Evolution* 40: 702-715.
- Wetzel, R. M., R. E. Dubois, R. L. Martin, and P. Myers. 1975. *Catagonus*, an "extinct" peccary, alive in Paraguay. *Science* 189: 379-381.
- Wilson, E. O. 1984. *Biophilia*. Harvard University Press, Cambridge, MA.
- . 1985. The biological diversity crisis: a challenge to science. *Issues in Sci. and Technol.* 2: 20-29.
- Zimmerman, B. L., and R. O. Bierregaard. 1986. Relevance of the equilibrium theory of island biogeography and species-area relations to conservation with a case from Amazonia. *J. Biogeogr.* 13: 133-143.

Crisis in Biosystematics of Arthropods

JAMES H. OLIVER, JR.

THE deteriorating capacity of the U.S. scientific establishment to identify organisms is a serious concern. Plant and animal identifications form the foundation of many areas of biological study, yet financial and organizational support for systematics, the study of biological diversity, is deplorable. E. O. Wilson (1) noted that only approximately \$38.6 million were devoted to systematics in the United States during fiscal 1985. At this rate, the classification of less than 1% of the species of organisms can be investigated. The need for a U.S. national biological survey has been advanced (2), but little action has resulted. Insufficient knowledge of biological diversity may result in flawed environmental impact statements, causing legislators to vacillate on important decisions related to acid rain, habitat destruction, pest management, and other issues. Interest in studying biological diversity is growing, however, with the realization that tropical forests are rapidly being destroyed along with their valuable undiscovered gene pools (3).

Expertise in systematics is also invaluable to persons working in agriculture, forestry, and human and veterinary medicine who must be able to identify with certainty the vectors of disease agents and other pests. In Europe, sibling species of anopheline mosquitoes differ not only in their habitats but in their vector competency. Millions of dollars can be saved by knowing what species to target for control because vector-associated diseases cause a major portion of illness throughout much of the world.

Two recent events in North America illustrate the importance of identification of arthropod vectors. First was the spread and common occurrence of the tick-transmitted Lyme disease. In the eastern United States, researchers have difficulty distinguishing *Ixodes dammini*, the primary tick vector of Lyme disease, from *I. scapularis*. Lyme disease in North America, first diagnosed in Wisconsin in 1969, caused an epidemic in Connecticut in 1975; it is now found in at least 32 states and on 6 continents. Many biomedical researchers think that if it were not for the acquired immunodeficiency syndrome (AIDS), Lyme disease would be the number 1 new disease facing us today. The second event was the introduction of the dangerous Asian tiger mosquito, *Aedes albopictus*, a potential major vector of several human disease agents, including arboviruses of the California serogroup that are indigenous to the United States (4). This mosquito was first recognized here in 1985 in Harris County, Texas. It is now found in 17 southern, eastern, and midwestern states, with the northernmost infestation in downtown Chicago, Illinois (4).

Biosystematic services and research on arthropods of medical and

veterinary importance worldwide are already declining. Difficulties will surely be exacerbated in the future because of poor financial support and the advanced age of many scientists involved in the research. Formerly, the Centers for Disease Control and the departments of Defense (DOD) and Agriculture (USDA) provided certain adequate taxonomic and biosystematic services and research on these arthropods, but this is not the case today. The National Institutes of Health (NIH) has not had a systematist on its Bethesda campus for a long time and the Smithsonian Institution (SI) does not employ a medical entomologist. Because of tight budgets and other pressures, responsibility for providing biosystematic research and services related to arthropods is falling between the cracks. For example, the largest and best tick collection in the world, containing more type specimens than any other, and currently housed at the SI, will soon be of little practical value. The curator of this collection and his assistant constitute the Acarology Unit; they are currently salaried by NIH, but only until September 1988, when NIH plans to close the unit. This remarkable collection and accompanying library will then be placed in so-called "maintenance-storage," with no specialist employed to identify ticks or to provide information on their biology or disease-vectorial capacities. There is no other laboratory in the Western world capable of providing such information.

Currently, SI collections of lice and biting midges are maintained in maintenance-storage, and the flea collection is cared for by a non-salaried scientist. A taxonomist employed by USDA (using SI facilities) spends 25% of his time on medically relevant Diptera such as blackflies, tabanids, and psychodids but must also spend time on 22 other families of flies. The DOD Walter Reed Biosystematics Unit, located at the SI Museum Support Center, studies mosquitoes but has had to drop other projects because of insufficient funding. Scientists competent to work on the systematics of mosquitoes, flies, ticks, chiggers, and other medically important arthropods on a global basis are rare indeed. As experts have retired or moved, they have not been replaced. Unless this trend is reversed, grave problems will be encountered regarding the epidemiology and control of infections, since preventive measures and development of vaccines often depend on detailed knowledge of the habits of the precise arthropod vector.

Can the situation be ameliorated? Why train students in biosystematics when jobs are scarce and research funds meager? The role of biosystematics must be explained to the public and to other scientists because of the need for more experts. The modern biosystematist, and certainly those in training, must use traditional museum techniques and have access to state-of-the-art technology. For example, in Africa, the *Anopheles gambiae* complex of mosquitoes, responsible for an estimated 1 million deaths due to malaria each year, is currently composed of six recognized species. Species determination is possible only by DNA probes or chromosome banding.

Limited budgets and other pressures have forced science administrators to make painful choices. Funding for systematics, however, is inexpensive compared to most types of research. No one denies the need for research and services on AIDS, cancer, and other critical health problems of today. Nevertheless, as a world leader in biomedical research, the United States needs to maintain competence in arthropod-associated disease research as well. Biosystematic investigations of arthropod taxa of medical and veterinary importance form the foundation of such competence.

REFERENCES

1. E. O. Wilson, *Science* 230, 1227 (1985).
2. M. Konstantin, *ibid.* 223, 443 (1984).
3. D. H. Janzen, *ibid.* 239, 243 (1988).
4. Centers for Disease Control, *Morbidity and Mortality Weekly Rep.* 36, 769 (1987).

The author is Fuller E. Callaway Professor of Biology and director of the Institute of Arthropodology and Parasitology at Georgia Southern College, Statesboro, GA 30460, and adjunct professor of entomology, University of Georgia, Athens, GA 30602.

Mr. SCHEUER. Thank you very much for a truly excellent statement, Dr. Raven. We're in the middle of a roll call vote so we're going to suspend for 12 or 13 minutes and we ask your indulgence and your patience. Thank you very much.

We've heard from Dr. Lovejoy and Dr. Raven. We'll now go to Dr. John Buffington, Deputy Regional Director for Research at the U.S. Fish and Wildlife Service. Please proceed and take five minutes, Dr. Buffington. We're very much interested in what you have to tell us.

STATEMENT OF DR. JOHN D. BUFFINGTON, DEPUTY REGIONAL DIRECTOR FOR RESEARCH, U.S. FISH AND WILDLIFE SERVICE

Dr. BUFFINGTON. Thank you, Mr. Chairman. I deliberately made my written testimony brief in the hope that the specific information you may wish to have for the record I could provide you in response to your questions. Your June 9 letter to Mr. Hodel requested information on three topics and I think I might help the record if I just comment on those three questions.

The first question you asked was how biological data collected by the Fish and Wildlife Service are used for conservation and management. I provide several examples in my written testimony of two databases which are rather extensively used. My comment is that we have in excess of 40 formal databases that are used for various management responsibilities and I have asked my staff to have that information published so it is available to people who may choose to access that information.

The second question you asked was how the proposed National Center for Biological Diversity would impact the scientific programs of the Fish and Wildlife Service. The National Center for Biological Diversity is assigned 12 functions. Currently, having looked at those functions, I feel that our existing research centers with the Fish and Wildlife Service are to a greater or lesser extent addressing all of those functions—as you can imagine, we're strong in some and less strong in others.

That underlies my agency's feeling that the act is not necessary, but in any case, I think that having looked at the proposed activities of the Center and the activities that are currently going on in our own Fish and Wildlife Service Research Centers, that certainly there's no reason to think that there's anything in conflict between the two sets, and if the Center did come into existence, I think that appropriate management by the Center in conjunction with what we're accomplishing at our Research Centers could lead to a program that would avoid duplication.

Finally, you asked the question, would it be useful if the biological inventory and monitoring programs under the Endangered Species Act were discussed. The Service does not rely on a systematic biological inventory process under the Endangered Species Act. Currently we have about 1,000 category one candidates for listing which we are listing at the rate of about 50 to 60 per year. A systematic inventory program would only add to the backlog. We have currently about 3,000 category two species which need additional information before we can make a decision for either listing or not listing.

A systematic inventory program could accomplish that much—give us the information as to whether or not they should be listed or just removed from further consideration—but still not within the context of our current budget impact the number of species listed.

In the endangered species area, we do have several major data sets and databases which are consistently used by the service and people interested in endangered species, which contribute to the management of our various responsibilities under the Endangered Species Program and the Act and, as I said, one of those databases is mentioned in my written testimony and I can provide information that you may want on any of the others.

I believe that's all that I care to say at this time, Mr. Chairman.
[The prepared statement of Dr. Buffington follows:]

STATEMENT OF DEPUTY REGIONAL DIRECTOR JOHN D. BUFFINGTON OF THE U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, BEFORE THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT, COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, U.S. HOUSE OF REPRESENTATIVES, CONCERNING H.R. 4335, THE NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND ENVIRONMENTAL RESEARCH ACT

JUNE 30, 1988

Thank you, Mr. Chairman, for the opportunity to testify again on legislation relating to biological diversity. While the U.S. Fish and Wildlife Service supports the protection of biological diversity and the goals of H.R. 4335, we believe enactment of additional legislation is unnecessary in view of existing laws and programs.

In my testimony of September 22, 1987, I went into some detail concerning activities of the Service in maintaining biotic diversity, so I will not repeat that now. In light of the provisions of section 6 of H.R. 4335, however, I will mention several of the uses of biological data and data bases in the management of biotic resources, including endangered species.

The Service's Migratory Bird Management Office is responsible for conducting and/or compiling field survey data for several migratory bird species, including annual waterfowl breeding ground surveys, the mourning dove call-count survey, the woodcock singing ground survey, and breeding bird surveys. This information is used by the Service in establishing the hunting regulations each year.

With respect to endangered species, the Service began in 1981 to develop the Endangered Species Information System (ESIS). By the end of this year, the Service will have invested \$1.3 million in this effort. As of now, the system is 90 percent completed for U.S. listed species and includes verified biological data on 435 species. This information is shared with other Federal agencies, States and other interested parties.

In addition to the two I have mentioned, there are of course other data bases used for management purposes.

Mr. Chairman, during the first day of the current set of hearings, representatives from two Interior bureaus and the Forest Service appeared before this Subcommittee. At that time you requested that they provide your staff with creative and constructive criticism of your proposal, and specific comments on the language of H.R. 4335. I am pleased to inform you that the Fish and Wildlife Service is participating in that effort. I must reiterate, however, that we believe there is no need for new legislation in this area.

I will be glad to answer questions you or other members of the Subcommittee may have.

May 27, 1988

ENDANGERED SPECIES INFORMATION SYSTEM - PROJECT BRIEF

The Endangered Species activity of the U.S. Fish and Wildlife Service (USFWS) has the responsibility to maintain and utilize large amounts of information and to supply information to other Federal agencies, States, and other interested parties. The Endangered Species Information System (ESIS) project was initiated in 1981 in order to develop a computer based method for improving the storage, retrieval, and dissemination of information on nationally listed species (threatened or endangered animals and plants). The design of ESIS, which took place in 1982 and 1983 through a Regional Advisory Group, calls for 66 data items of information - including detailed narratives as well as highly standardized "keyword" items for information searches. Many of these items are structured to provide "cross reference" to other Federal systems and to the computerized fish and wildlife information systems being developed in several States.

Using a 3-part data collection workbook and a data entry guide to enforce standardization, a prototype system containing 25 species was completed in 1984 as a result of a cooperative effort between the USFWS's Division of Biological Services and Office of Endangered Species. Information is presently being collected on about 56 species. This information is acquired from recognized species experts approved by the appropriate USFWS Regional offices.

Loading of fully verified species data for 436 species records was completed in May 1988. Over 56 additional species will be loaded in the near future. Information on these species will be available through the USFWS Regional/Field offices. It is projected that currently listed domestic species will be loaded by January 1989.

Great care has been taken in designing a useful system with high quality and fully verified data. The ESIS project is considered of vital importance to the USFWS's Endangered Species efforts. It is anticipated that the resulting system will be a future focal point for information requests, evaluations, planning, and summaries on nationally listed threatened and endangered species.

For further information, please contact:

ESIS Project Leader
ESIS Database Administrator
U.S. Fish & Wildlife Service
Division of Endangered Species and Habitat Conservation
Broyhill Bldg., Suite 500
Washington, D.C. 20240

The Washington Office contact for the ESIS project is Michael J. Hein (703-235-2760; FTS:235-2750).

Mr. SCHEUER. Thank you Dr. Buffington. Dr. Buffington, I say in all respect and in the kindest possible spirit, that it seems to me that you're saying, "we've only had a chance to evaluate and to list one out of 20 more or less of the threatened and endangered species out there so therefore we aren't really keen about having anybody else identify endangered species because that's only going to add to the list of endangered and threatened species that we really aren't doing very much about." Isn't that more or less what you're saying? I don't want to put words in your mouth but that's the gist of your remarks as I interpret them.

Dr. BUFFINGTON. What I was trying to do is provide some specific numbers to indicate where various species are in the process as they enter into formal coverage under the Endangered Species Act.

Mr. SCHEUER. Yes, but as I understand it, you're hopelessly behind in the process of identifying endangered species and certifying them as such.

Dr. BUFFINGTON. Not in identifying them. That was the point I was trying to make. We have a thousand candidate species that our endangered species staff feel could be listed based upon existing information if we had the resources to list them.

Mr. SCHEUER. And you have the resources to list perhaps one out of twenty so far.

Dr. BUFFINGTON. Fifty or sixty a year is what we have been doing.

Mr. SCHEUER. Fifty to sixty a year. So you're falling hopelessly behind. The point is, that as I see it, and I'm no expert on this matter—but the experience has been that it takes so long to get these species listed as endangered that by the time you manage to get through that process, years after the early warning signal has gone up, they aren't endangered, they're gone!

They're either extinct or so far down the road to extinction and their whole biological environment, their ecosystems, are so far down the road to destruction that it's too late for Herpicide if any of you are old enough to remember that ad.

Herpicide was a hair restorer when I was a kid. The ad was a guy absolutely bald as a billiard ball—not a hair on his head. The caption was: "It's too late for Herpicide." Isn't that what you're saying? It's too late for Herpicide, so don't give us any more listings that will make us even too much later for Herpicide.

We're not doing the job now, and if you give us additional listings it's going to be even more painfully obvious that we're not doing the job. I say that more in sorrow than in anger, because it's obvious that you're very well intentioned and highly professionally qualified, and you'd like to do the job, but your agency is not doing the job. It's painfully inadequate to the challenge.

It seems to me that what you're saying is, we aren't doing the job, we can't do the job, so don't dramatize the fact that there are even more species out there waiting to be identified in addition to the twenty-to-one balance that currently prevails. I don't want to be unfair. Is that unfair?

Dr. BUFFINGTON. Yes.

Mr. SCHEUER. All right. Tell us why.

Dr. BUFFINGTON. The only point I was trying to make, Mr. Chairman, is that I believe the functions of the Center are aimed at pro-

viding information about species. What I've indicated is that we already have 1,000 species that we already have the information for.

Mr. SCHEUER. But what are you doing about it?

Dr. BUFFINGTON. We're listing them at the rate of 50 to 60 a year.

Ms. SCHNEIDER. Could the gentleman yield?

Mr. SCHEUER. By all means.

Ms. SCHNEIDER. It's my understanding that you have here that by the end of this year the Service will have invested \$1.3 million in this effort of the Endangered Species Information System, and as of now the system is 90 percent completed for U.S.-listed species. Now, it seems to me that if this new system is practically completed then you ought to be on line with all of the data being listed within your computers in no time at all.

Isn't this new technology going to speed up the process?

Dr. BUFFINGTON. The Endangered Species Information System is designed to provide information about species that already are listed and I think that what is getting confused here is the movement of species from the candidate list to the actual formal listing under the Endangered Species Program. That's the only point I have been trying to raise here, and I think the efforts of the Center would be aimed more at bringing species onto the candidate list.

All I've indicated is that we already have more than we can handle in terms of the candidate list. We have 1,000 species there and, granted we are not moving them from the candidate status to formal listing status at a very rapid rate.

We are moving them as rapidly as resources will permit us, those resources being manpower and dollars. Adding more species to the candidate list will not in any way affect our ability to protect those species under the Endangered Species Act.

Ms. SCHNEIDER. So, in essence—

Mr. SCHEUER. Well, excuse me, let me just ask this, but doesn't it at least honestly identify the order of magnitude of the problem which we're so painfully not dealing with? Isn't knowledge for the sake of knowledge important? Shouldn't we know how many endangered species there are out there that need Herculean efforts on our part to preserve and protect?

Dr. BUFFINGTON. Mr. Chairman, as a scientist I cannot help but embrace the concept that knowledge is worth having.

Mr. SCHEUER. OK. Stop there. I yield to my colleague.

Ms. SCHNEIDER. Well, along the same lines—you mentioned resources, manpower and money, so we can deal with that minor detail in a little bit, but regarding the technology, I'd like you to address that. Are the computer systems among the various federal agencies compatible?

Dr. BUFFINGTON. I guess that gets down to your philosophy and how you manage data. I don't think that's an issue because the data systems that we have set up where we feel other agencies would have need for access to them—in fact, they do have access to them.

For example, the Endangered Species Information System—about a third of the people accessing that now are people from other federal agencies and states—we get private contractors accessing it. We have another major database which I mentioned in

my written testimony—the Wetlands Plants Database. There are literally thousands of entries into that. That is accessed widely by other federal agencies, state agencies.

As a manager and somebody who has to deal with these kinds of questions, I feel more comfortable with having discrete databases dealing with a specific set of subjects that are accessible rather than try to bring massive databases together into one big megadatabase. That kind of system—just pragmatically—doesn't seem to work.

Ms. SCHNEIDER. But, do we have a model? I don't think so. I mean, we here have jurisdiction over EPA, NOAA and a number of different programs that those federal agencies have jurisdiction over. It seems to me that the coordination of the various databases and the synthesizing of information has only led to a more rapid and more clear database that is useful in making policy decisions. What I'm anxious to focus on—do all of these federal agencies, you say about a third of them feed into the system—do they coordinate the information formally—the federal agencies?

Dr. BUFFINGTON. I'm not exactly sure what formally means. I would say informally there's excellent exchange of information among the technical people in all the agencies. The technical people are regularly meeting with each other, exchanging technical information and in many cases—for example, I did mention the plant species database—that was part of the National Wetlands Inventory. We actually had employees of other federal agencies working with us.

They were on detail to us and they were part of our—I supervised them for several years so that we had United States Geological Survey, we had the Soil Conservation Service, we worked closely with the Corps of Engineers because all of our agencies need the National Wetlands Inventory.

So, on the ground we are working together very closely.

Ms. SCHNEIDER. And don't you think that a National Center with a data network would speed up the whole listing process?

Dr. BUFFINGTON. You're not using listing in the sense of endangered species? You're talking about bringing data in a general sense?

Ms. SCHNEIDER. Yes.

Dr. BUFFINGTON. Coordination and communication are activities that you can never do enough of. The question becomes cost-effective trade-offs. Right now, I think that with the existing sets of data that we have out there, there's extensive and effective communication. Obviously there are kinds of information that you and Congress feel you may need, members of the Administration, Presidential appointees feel that they may need, which we don't have.

I don't think that's too surprising. I don't think there's any amount of money that will give us all of the information we want. So, you can always communicate more, you can always coordinate more, and the benefits of doing that will always be good. The question is, how much can you afford?

Mr. SCHEUER. Dr. Buffington, I'm having conscience pangs. I think I cut you off a moment ago after you said knowledge is power. That seemed like such a salubrious place to end that particular little colloquy that perhaps my sense of the roundness of

the thing caught up with me. Did you have something else to add after that?

Dr. BUFFINGTON. I feel, Mr. Chairman, that that might be an appropriate place to interrupt my testimony for both our sakes. [Laughter.]

Mr. SCHEUER. Touche. Okay. Now we'll hear from Mr. John Flicker, Vice President for U.S. Operations for The Nature Conservancy. We're all deeply grateful to The Nature Conservancy for 50 or 60 years in my lifetime of their extraordinary contribution to the environment, planning, conservation, aggregation of precious virgin land preservation of this incredibly beautiful resource all over the country. We're grateful to your organization and we're very happy that you're here with us, Mr. Flicker. Please proceed.

**STATEMENT OF JOHN FLICKER, VICE PRESIDENT, U.S.
OPERATIONS, THE NATURE CONSERVANCY**

Mr. FLICKER. Thank you for those kind comments, Mr. Chairman and I want to thank you for this opportunity to testify, and thank both you and Representative Schneider for the leadership role you've played in helping to bring the preservation of biological diversity into the forefront and making it a truly national goal.

We're very supportive of that effort and we want to help in any way we possibly can. As you know, the preservation of biological diversity is The Nature Conservancy's sole mission. It's all we have done since our inception in 1950. In addition to the extensive inventory work which we'll talk about later, The Nature Conservancy also goes about actually protecting areas. The acquisition work that you mentioned—we currently acquire land at the rate of about 1,000 acres per day, seven days a week.

In addition, we manage a good deal of property. We currently have the largest private reserve system in the world, about 1,000 areas across the country that we own and manage ourselves and that is continuing to grow.

There's been several references today to Hawaii and the importance of Hawaii in preserving biological diversity. I want to thank you, Mr. Chairman, for the terrific work that you did yesterday on protecting some funding for preserving some unique habitat in Hawaii.

Several million dollars was threatened and thanks to your leadership you came to the fore and helped protect that funding for the Fish and Wildlife Service. I want to thank you for that effort.

Mr. SCHEUER. Footnote that and not on your time, on our time. Here there was \$4 million appropriated for Hawaiian National Wildlife Refuge. Ninety percent of the bird life in Hawaii is unknown anywhere in the world outside of Hawaii and Hawaii is responsible for 60 percent or more of all the species, animal and plant that are extinct in the United States, the fifty states.

Hawaii is a precious gem of animal and plant diversity. We're lecturing the developing countries of the world to preserve their tropical rainforests, to stop destroying the flora and the fauna. We've been telling them we're going to help you with your Third World debt but you've got to shape up on your treatment of the planet and you've got to stop these degrading practices.

Here, while we're lecturing to them about adding to their costs of agriculture, of development, by having environmentally and biological diversity sensitive protective measures, we are cutting out \$4 million to preserve biological diversity in the one area of the United States that has lost the most, that is the most unique and where our failure has been so transparent.

To me, that is the most unbelievable intellectual dishonesty and sanctimonious cant. For us to be in that immoral posture while we're lecturing to the Third World about their environmentally inadequate practices, to my mind, that is hypocrisy at its most blatant. Thank God the Congress didn't do that.

Mr. FLICKER. I think you said it much more eloquently than I could. I agree with you completely and I might add that yesterday in the course of that effort we've been talking here about inventory of biological diversity, we asked the question "What's out on that property that we are trying to protect in Hawaii," that the Fish & Wildlife Service is trying to protect? What do we know about it? We called the Hawaii Natural Heritage Program and asked them what information they had on that piece of property.

In a matter of hours we got a report back from them. It is a four-page report which I hope you have a chance to take a look at of everything we know about that property—the best, by far the best scientific information of the species, communities and systems on that property that are of any biological interest or concern.

[The report mentioned above follows:]

M E M O R A N D U M

TO: Nat Williams
cc: Alan, Tim, Oahu Forest Refuge file

FROM: Audrey Newman

DATE: 28 June 1988

SUBJECT: Candidate Plants and Listed Snails on proposed Oahu Forest Refuge

As we discussed on the phone today, this document contains a list of candidate plant species and varieties (taxa) "potentially" on the two parcels identified in the Oahu Forest Refuge Proposal. The list requires a little explanation.

For each plant species or variety, we have provided the federal status as given in the USFWS' "Review of plant taxa for listing as endangered or threatened species; notice of review", published in the Federal Register, 50CFR, Part 17, on September 27, 1985. Using this official list, we get the following breakdown:

32 current and 15 previous candidate plants in or near the parcels:

Category 1 = 26

Category 2 = 6

Category 3B = 3 (no longer being considered for listing)

Category 3C = 12 (no longer being considered for listing)

(The categories are defined in the Federal Register.)

To complicate things, the taxonomy of many Hawaiian plants has been revised and many of these candidates will be taken off the list when it is republished. A few new ones may be added. You may be asked about this in your discussions. Using the most conservative predictions, 12-17 plants in or near the parcel will still be candidates.

Tim Johns suggested that I also forward our preliminary information on listed Achatinella snails in the area. It follows the plant list in this document. Since these snails are disappearing rapidly, the information is presented in time periods. In brief, at least 13 listed Achatinella snails were historically reported from these parcels. Since 1970, 3-5 have been seen but others may still survive there.

I hope this helps.

Preliminary List of Rare Plants of Waimea and Waipio Parcels
identified in Oahu Forest Refuge Proposal

TAXON (FEDERAL STATUS)	WAIMEA PARCEL (IN OR VERY NEAR)	WAIPIO PARCEL (IN OR VERY NEAR)	GENERAL AREA (LEEWARD SLOPES AND SUMMIT REGION OF THE NORTHERN KOOLAU MOUNTAINS)
Adenophorus periens (1)	X		
Alectryon macrococcum (1)		X	
*Astelia veratroides	X		
var. veratroides (3C)			
Bidens populifolia (3C)		X	
Bohea sandwicensis (3C)	X		
Botrychium subbifoliatum (1)			X
Cyanea grimesiana	X	X	
var. grimesiana (3C)			
*Cyrtandra basipartita (1)			X
*Cyrtandra bryanii (1)	X		
*Cyrtandra cordifolia			X
var. brevipilata (1)			
*Cyrtandra dentata (1)	X		
*Cyrtandra ellipticifolia (1)	X		
*Cyrtandra intrapilosa (2)	X		
*Cyrtandra kahukuensis (1)	X		
*Cyrtandra koolauensis (1)			X
*Cyrtandra plurifolia (1)	X		
@Delissea subcordata		X	
var. obtusifolia (3C)			
(syn. D. subcordata)			
*Dracaena aurea (3C)	X		
*Dracaena forbesii (1)			X
+Dubautia plantaginea		X	
var. plantaginea (3C)			
#Eugenia koolauensis (-)			X
*Euphorbia hillebrandii			X
var. waimanoana (1)			
+Euphorbia multiformis			X
var. multiformis (3C)			
Exocarpus gaudichaudii (3C)		X	
Hesperomannia arborescens (1)	X		
Hibiscus kokio var. kokio (2)			X
Joinvillea ascendens	X	X	
ssp. ascendens (3C)			
*Labordia fagraeoides	X		
var. fagraeoides (1)			
*Labordia glabra (2)	X		
*Lobelia gaudichaudii			X
var. koolauensis (1)			
#Lobelia hypoleuca (-)		X	
Lobelia oahuensis (1)		X	
Neraudia angulata (1)			X

+Ochrosia compta (3C)	X		
Pelea christophersenii (1)		X	
@Pelea descendens (1)	X		
(syn. P. lydgatei)			
*Pelea hiiakae (2)			X
Pelea kauaensis (2)	X		
*Pelea lakae (1)	X		
Pelea lydgatei (1)			X
Pelea sandwicensis (1)		X	
*Pittosporum cauliflorum	X		
var. cauliflorum (3C)			
*Pittosporum cauliflorum	X		
var. cladanthoides (3B)			
*Pittosporum cauliflorum	X		
var. pedicellatum (2)			
Platanthera holochila (1)		X	
*Pritchardia kahanae (2)		X	
*Pteralyxia caumiana (3B)	X		
*Rauvolfia sandwicensis	X		
var. sandwicensis (3B)			
@Rollandia calycina (2)		X	
(syn. R. lanceolata			
ssp. calycina)			
@Rollandia crispa		X	
var. crispa (1)			
(syn. R. crispa)			
Rollandia humboltiana (1)		X	
Rollandia purpurellifolia (2)			X
@Rollandia sessilifolia (1)	X		
(syn. R. longiflora)			
Rollandia st.-johnii (1)		X	
Sanicula purpurea (3C)		X	
*Stenogyne sherffii (1)	X		
*Styphelia tameiameia			X
var. hexamera (3B)			
@Tetraplasandra gymnocarpa	X		
var. pupukeensis (1)			
(syn. T. gymnocarpa)			
*Tetraplasandra lydgatei (1)			X
*Tetraplasandra meiandra	X		
var. bryanii (1)			
*Tetraplasandra oahuensis	X		
var. eradiata (1)			
*Tetraplasandra pupukeensis	X		
var. pupukeensis (1)			
Viola oahuensis (1)	X	X	
Zanthoxylum dipetalum (1)			X
*Zanthoxylum semiarticulatum	X		
(1)			

Federal Status and taxonomy according to USFWS' "Review of plant taxa for listing as endangered or threatened species; notice of review", published in the Federal Register, 50CFR, Part 17, on September 27, 1985.

* = Taxon will probably lose consideration for federal listing as an endangered taxon as a result of its being lumped into a common taxon or its being recognized as a hybrid in the Manual of the Flowering Plants of Hawaii (W.L. Wagner et al., in press);.

+ = Taxon probably will be dropped from consideration for listing as endangered, name used by Wagner et al. in the wide sense.

@ = Taxon considered rare by HHP (lumped by Wagner et al. into a wider taxon).

= Taxon not appearing on the list of candidate endangered species, but considered rare by the HHP.

Preliminary List of Rare Plants of Waimea and Waipio Parcels identified
in Oahu Forest Refuge Proposal

Location and taxa	pre-1945	1945-1970	post-1970
I. Waimea section (N. of Kaiwikoele, W. of summit, S. of Pupukea Rd.)			
<u>Achatinella bicolor</u>	X	X (just N. of area)	
<u>A. valida</u>	X	X (just N. of area)	
<u>A. caesia</u>	X		
<u>A. livida</u>	X (poss. in this area)		
<u>A. sowerbyana</u>	X		
<u>A. curta</u>	X	X	X (just S. of area on Kawailoa trail)
<u>A. pulcherrima</u>	X		
<u>A. bulimoides</u>	X		
<u>Amastra spp.*</u>	X	X (just N. of area)	
Helicinid *	X	X (just N. of area)	
II. Waipio section (N. of Kipapa trail, W. of summit, S. of Schofield E. Range)			
<u>Achatinella lila</u>		(?)	X
<u>A. sowerbyana</u>	X	X	X
<u>A. leucorrhaphe</u>	X	X	(?)
<u>A. swiftii</u>	X	X	(?)
<u>A. casta</u>	X		
<u>A. papyracea</u>	X		
<u>A. byronii</u>	X		
<u>A. pupukanioe</u>		(possibly here; just S. of this area in Waiawa)	

It certainly isn't everything that needs to be known about that property, but it is the best information organized in a systematic way that there is about that property, and we received that information here in Washington in a matter of a few hours after we requested it by computer. State Heritage programs across the country are able to do that.

That is one of the points I would like to make relative to this bill. I really have two points I would like to leave you with.

The first is that the principal purpose of any bill relating to biological diversity information management should be supportive and should be designed to enhance the existing network of state Natural Heritage programs.

There already exists a massive network of state Heritage programs across the country which operate for the sole purpose of protecting—of gathering and managing information on biological diversity. This network was established and operates within individual state governments and it operates in nearly every state. Today there are over 300 full-time professionals doing nothing but gathering and managing information on biological diversity through state Natural Heritage programs. They have combined operating budgets of over \$15 million annually. They have been operating now for about 15 years. They get an average of over 30,000 requests for information each year, thousands of requests to review environmental impact statements, for example.

This system, while it isn't perfect, has withstood the test of time. It has proven itself in the marketplace. People use it. People pay for it. It works.

In effect it is setting the standard for biological diversity information management across the country. I want to emphasize that these are not Nature Conservancy Heritage programs. While we sort of claim the parenthood of these programs, these are state Heritage programs. We designed the methodology and we've turned them over to state governments. This is one of the reasons I am very pleased that Mr. Boone is here to testify from the Maryland Heritage program. That is the Maryland State Heritage Program. It is not the Nature Conservancy's Heritage Program. State governments have adopted these across the country.

These Heritage programs aren't perfect by far. There are many ways they could be improved and we have heard a lot of things today about how information management could be improved. We strongly support those improvements. They cost money and we hope that this legislation and other legislation could generate money to support these Heritage programs.

What we are concerned with in this legislation is that it would open a debate as to what methodology should be the standard for biological diversity information management. That debate has been ongoing for many years. Right now 47 states have made their choice as to what methodology they want to use. The marketplace at the local level has made its choice as to what it wants to use.

I think we are beyond the point where it is productive to experiment with new methodologies. We have built the system and we hope that any legislation that's enacted would improve and build on the methodology that is in place across the country already.

Mr. SCHEUER. One thing that's terribly important is that we be able to compare apples and oranges and that we have a system that everybody can provide inputs to. It would be a disaster, in my opinion, if we ended up with systems that weren't compatible and couldn't communicate.

Mr. FLICKER. That's exactly right. Registries of this sort are inherently autocratic. It is not a democratic process where everybody can try their own thing. You need a system that is compatible. You said it exactly right. You have to be able to compare apples with oranges. That is critical.

Mr. SCHEUER. I hope as we get started with this bill and with the Center that any of you will send up the early warning signal if it looks as if we are doing something that isn't compatible with the best of what exists. Do you see what I mean?

Mr. FLICKER. Exactly right. Thank you.

Mr. SCHEUER. We would really want to hear from you now, early on, at the take-off rather than at a crash landing some years hence where you say gee, you've developed this system, and we've got this system, and never the twain can meet and what do we do about it?

Mr. FLICKER. That's right.

Mr. SCHEUER. We ought to all be communicating now to avoid that kind of a situation.

Mr. FLICKER. Good, thank you.

Mr. SCHEUER. That was on my time—not on yours.

Mr. FLICKER. That's fine. I agree with you totally. You can have all of my time you wish for that kind of a point.

The second point I would like to leave you with is that the Office of Technology Assessment, as you know, recently came out with a report as to what a National Center for Biological Diversity ought to include.

Mr. SCHEUER. We requested that report and we had a hearing on it in 1987.

Mr. FLICKER. We think it is an excellent report, and the role that's laid out for a national center in that report we think is excellent, and any legislation ought to follow what is set out in that report.

In general, the center's principal function ought to be to further and enhance the work of the state Heritage programs and the system that's in place at the local level. Specifically, the center ought to focus on three things. It ought to do the things that individual state Heritage programs can't afford to do, particularly in expanding the classification system and developing the taxonomic work that each individual state Heritage program can't really afford to do.

Secondly, it ought to maintain a national database, or at a minimum a database of databases, so that there is a centralized function that's available for all the national users that there are.

Thirdly, it ought to provide funding, matching grants, for the state Heritage programs to help them along when funding is tight at the local level.

Those ought to be the principal functions of a national center. I think we've got the makings of putting that kind of a center together and it would greatly enhance the preservation of biological diversity.

That's all I have to say, Mr. Chairman. I'd be happy to answer questions.

[The prepared statement of Mr. Flicker follows:]



TESTIMONY OF JOHN FLICKER
VICE PRESIDENT, U.S. OPERATIONS, THE NATURE CONSERVANCY
BEFORE THE HOUSE SCIENCE, SPACE AND TECHNOLOGY SUBCOMMITTEE ON
NATURAL RESOURCES, AGRICULTURAL RESEARCH AND ENVIRONMENT

June 30, 1988

Mr. Chairman, members of the subcommittee, thank you for inviting the Nature Conservancy to testify today regarding H.R. 4335, The National Biological Diversity Conservation and Environmental Research Act. We commend you especially, Congressman Scheuer, for focusing your attention on the issue of the preservation of biological diversity.

Destruction of biological diversity has reached crisis proportions. Many prominent scientists believe that the accelerating extinction of plant and animal species is the most serious problem in the world, in part because of its irreversibility, entailing the loss of genetic resources which have taken millions and millions of years to develop. No one has expressed this concern better than E. O. Wilson of Harvard University, who in 1980 wrote,

"What event likely to occur in the 1980's will our descendants most regret, even those living a thousand years from now? The worst thing that can happen -- will happen -- is not energy depletion, economic collapse, limited nuclear war, or conquest by a totalitarian government. As terrible as these catastrophes would be for us, they can be repaired within a few generations. The one process ongoing in the 1980's that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our descendants are least likely to forgive us."

Species extinction is rapidly increasing, mainly because we are destroying the last natural habitats remaining on our small planet. We do this to meet our continuously growing needs for food, fiber, and other resources, yet the habitats and species being destroyed are themselves resources. In fact, they represent our total pool of future renewable resource options, so that their short-sighted destruction is like a farmer eating up the seed corn he needs for next year's crop. And these biological resources are not only economic ones, they also constitute the main furniture of our psychological and spiritual lives. Imagine a world with no more zebras or butterflies. Suppose that all the world's Rembrandts were being burned up.

Ultimately, this process of destruction will eat mankind out of house and home. But by that time, millions of our fellow creatures will have died out completely. The crucial, immediate need is to provide living space for imperiled biota in a worldwide system of nature preserves. Since the total amount of natural lands continues to shrink, the selection, placement, design, protection, and management of such nature preserves must be systematically fitted into integrated land use patterns designed to meet all human needs.

In this context, biodiversity conservation is a complicated business and can only succeed on a technically sophisticated basis. We need much more data than we needed when there was more slack in the system, and we need better information management devices to put such data to effective use. Information is power. It enables us to make good, qualified decisions in the practical actions of biodiversity conservation, mainly regarding habitat preservation and the impact of development. The Nature Conservancy believes in a well thought out, step by step approach toward accomplishing our mission: to preserve the full array of biological diversity by finding, protecting, and maintaining the best examples of communities, ecosystems, and endangered species in our natural world.

We have developed a three step process as follows:

1. Identification - the scientific basis to guide conservation.
2. Protection - usually through acquisition or protected status through public agencies or private agreements.
3. Stewardship - long term management.

Since you have asked us specifically, Mr. Chairman, to address the issues of "the adequacy of the national biological data base and what work must be done to achieve a national goal of biological conservation," I will emphasize in my remarks what we consider to be the important first step: identification.

Since its founding as a special committee of scientists in 1917 and its formal incorporation in 1950, The Nature Conservancy's sole objective has been biodiversity conservation. With this specialized focus, the Conservancy has been the leader in the private sector in both methodology and implementation of biodiversity conservation. Our organization has attracted over 450,000 members and 435 corporate associates, has carried out over 5,000 land conservation projects covering 3 million acres, has established 47 state field offices and developed the staff and volunteer capacity to manage our 1000 nature preserves.

Over the years, the keystone of Conservancy activity has been to "think global and act local." Realizing that most conservation and development decisions are made at the local level, we began to work with state governments to establish information systems. These biodiversity data centers are called State Natural Heritage Inventories. They are highly developed

and continually refined systems for the collection, management, and use of biological, ecological and related information.

The first such program began in 1974 in cooperation with the South Carolina Department of Wildlife and Marine Resources. Using this program as a model, similar cooperative efforts have been started and are continuing in nearly every state. Similar programs have been undertaken in seven Latin American countries. Operation of these biodiversity data centers is too complex to describe fully here, but the individual programs have become the best sources of information on the status and geographic distribution of species and natural communities for conservation use.

The data centers generate and periodically update "natural diversity scorecards" which efficiently denote land conservation priorities for use by a growing number of conservation institutions. Information from the centers is also used in environmental impact assessment, guiding the placement and design of thousands of development projects every year in ways that minimize damaging effects on biodiversity and avert unnecessary conflict and expense.

The Conservancy continues to support the information management systems used by these Heritage programs, improves them continually, and maintains central databases which assist state programs by making them even more efficient and facilitating multi-state analyses and priority setting.

In the Office of Technology Assessment report titled "Technologies to Maintain Biological Diversity" the state Natural Heritage programs are recognized in their importance as the only comprehensive nationwide information system dealing directly with both species and ecosystem diversity. The report notes that "the quality and quantity of information varies from state to state. A few states do not yet have programs. An inventory of species communities that are not threatened is just beginning." In spite of these limitations, "this is the most comprehensive database on biological diversity. In many geographic areas The Nature Conservancy is the only institution collecting data on rare, sensitive, or endemic resources that may require special management to maintain their integrity as populations. In these areas the Heritage programs help to fulfill an important gap in biological data needed for on site maintenance of biological diversity."

Heritage data and systems get tremendous use. While they were originally designed primarily with biological land conservation planning in mind, they have turned out to be well adapted to many other uses, such as aiding in environmental impact review, development planning, natural resource management, scientific research, and educational applications.

In 1986, some of the most active state programs individually reviewed the potential impact on biological diversity of over 2000 proposed development projects, while nationwide the Heritage programs collectively reviewed perhaps 30,000 such projects. Because of their tremendous success in improving conservation and natural resource decision making, states have taken over full support and management for most Heritage programs, following the initial partnership period. With an infrastructure consisting of scores of operating data centers and over 300 staff, the states have made a highly significant investment in biological information.

While state funding has been more reliable than any federal funding efforts towards an adequate biological data system, the Heritage inventories often have been run on a shoe string, pieced together with private funding, fees, contracts, and grants. We therefore welcome the OTA's suggestion that the federal government could enhance this existing natural heritage network through stable funding. It is our hope that H.R. 4335 would provide that vehicle, and we wholeheartedly endorse such efforts.

The OTA report further recommends establishment of a small clearing house for data on biological diversity. The purpose of this clearing house would be to coordinate data collection and distribution. The OTA report recommends that the clearinghouse perform the following functions: survey and catalog existing federal, state, private, and international databases on biological resources; evaluate the quality of databases; provide small grants and personnel support services; strengthen existing databases; and publish annual reports on the status and needs of the biological data system. The clearing house would not necessarily maintain its own database, but would facilitate access to databases and reduce duplication. Small grants could be given to cover gaps in data. The Nature Conservancy in previous testimony has supported the establishment of such a coordinating body. We believe such a clearinghouse would adequately complement and coordinate current activities and build upon data systems already in place such as the Heritage programs.

Our experience has taught us that decentralization is the most effective way to organize a strategy for biological diversity protection. We believe that the best use of any federal resources devoted to biological information systems is to compliment the on-the-ground activities currently being financed by the states and private institutions.

We firmly endorse the establishment of a national policy for the conservation of biological diversity. We agree that federal agencies must coordinate their efforts and develop a strategy for the conservation of biological diversity. While we think that they are currently doing an inadequate job of protecting biological diversity, we stand ready to work with them as they move forward toward that goal.

We believe that the creation of a new center for biological diversity, as outlined in H.R. 4335, is not necessary. Given that a major network of information systems already exist, the first requisite of any legislation should be to insure that any new initiative does not harm the existing program. The proposed new center needs only to "work closely" with the Heritage Program network, just as it does with numerous other entities. There is no requirement that the new center operate consistent with the goals and methodology of the Heritage Program network. However, any national center which does not operate consistent with the Heritage Program network goals and methodology would be a serious detriment to it.

The statement of principle in H.R. 4335, establishing the conservation of biological diversity as a national goal and priority, should guide the actions of the federal government. And while we recognize that there may be a need to impose legal requirements such as those in Section 5, we recommend the separation of the regulation section and the information section of this legislation, and that congress address these questions separately. The reason for this quite simply is to resist politicizing of the information system itself.

To illustrate how this politicizing has happened in the past, I would call to mind the listing process of the Endangered Species Act. While this body has seen fit to pass the reauthorization of the Act, concerns over specific species have held up its passage in the Senate for years. Inadequate funding as well as political considerations stalled the listing process resulting in well over a thousand candidate species waiting to be listed. We would like to see the Biodiversity Act written in such a way that biological inventory work can proceed full steam ahead regardless of political considerations, arming conservationists with powerful information as they attack this serious global problem.

In conclusion, Mr. Chairman, we thank you again for allowing us to make these suggestions, and for your consideration of them. We stand ready to work with you and your colleagues, as well as the federal agencies in this important endeavor. We understand and appreciate your deep concern, Mr. Chairman, as it has been our singular concern as well. The leadership you provide has had the profound effect of focusing congressional attention on this crucial issue. Please allow us to assist you as you move forward. Thank you, Mr. Chairman.

Mr. SCHEUER. Congresswoman Claudine Schneider.

Ms. SCHNEIDER. I'd like to hear from Mr. Boone.

Mr. SCHEUER. I'm sorry, Mr. Boone. We hadn't completed our panel.

Mr. Daniel Boone, Coordinator of the Maryland Natural Heritage Program, we're delighted to hear from you and then we'll have questions for the whole panel.

STATEMENT OF D. DANIEL BOONE, COORDINATOR, MARYLAND NATIONAL HERITAGE PROGRAM

Mr. BOONE. Thank you, Mr. Chairman. Appreciate the opportunity to testify today. I think the Heritage programs are one of the best tools for preserving biological diversity that we have in this country now, and my testimony that's submitted certainly reflects that.

I'd like to give you an overview of what a Heritage program is. Its purpose is the preservation of natural diversity. We attempt to identify and help protect, and that is an important point, to help protect because we are actively involved in protection.

The Heritage program was created by the Nature Conservancy Program in Maryland. In 1979 we were used as a national model and we were transferred to state government in 1981.

We have a \$700,000 budget starting tomorrow and we have 10 classified and about a dozen contractual employees. We are organized along four major lines. Our inventory effort: we have a staff of ecologists that roam the state looking for areas of important biological diversity. We have determined the rare species and we have determined the significant habitats and are out there actively looking for sites where they occur.

The inventory staff reports that information to our Data Management Group, which manages the information, puts it into computerized files and map files and basically organizes it so that it can be used for planning and protection.

We have an environmental review group that takes the information and plugs it into land use decisions. In Maryland last year we had over 1500 land use decisions that had the benefit of the Maryland Heritage's information.

Protection planning is probably our largest and most all-encompassing effort. We take—there are so many areas. We have over 500 sites now in the state that we know are extremely important for preserving the state's biological diversity and we try to obtain the protection on those through a variety of means, whatever will work.

We work closely with the Nature Conservancy obviously, and they have raised about a million dollars annually towards buying important habitats. We also have a national model, I would consider it—the Chesapeake Bay Critical Area, where the state legislature has essentially zoned a thousand foot perimeter around the Chesapeake Bay and all its tributaries, and within that zone we have identified 80 habitats that are under consideration by the local jurisdictions for protection. Actually they are going to be required to ensure their preservation.

We work with local jurisdictions. We have been funded by a number of Federal agencies, particularly NOAA, to develop site specific information that we will use in working with local jurisdictions and private land owners to affect conservation for these sites.

I think that is an important point because if you consider the land use decisions and what is going to happen to the landscape, it is going to be done primarily at the local level. I mean we can talk about Federal mandates to preserve biological diversity but most of the decisions that affect biological diversity are done by private landowners and local jurisdictions and we feel that by working with those groups that we are going to have more impact in protecting biological diversity.

The state legislature has appropriated a million dollars annually for a Heritage conservation fund, and we are trying to provide incentives to landowners by remunerating them for their interest in the land that we have designated, and we are working closely with our public land management agencies to not only identify but help determine protection needs for the sites.

We deal mostly with ecosystems. We used species and it is true that we only know enough about the vascular plants and vertebrate animals to determine where these sites are, but invariably the habitats that are important for vascular plants and vertebrate animals also turn out to be important habitats for invertebrates. We have a number of examples where our sampling in conjunction with personnel from the Smithsonian has determined a new species of invertebrate based on the important habitats that we have identified. I think that is a major distinction in Heritage programs over single species research—that we use ecosystems, important habitats to determine where effort should go.

It is really difficult for me to communicate what a Heritage program does. I would like to extend an invitation to you, Mr. Chairman, and members of the Subcommittee, to come visit a Heritage program. We are in Maryland in Annapolis, we are close by and we would love to give you a demonstration of the system and better yet, to get out on a field trip, and I think when you are out there and you understand the level of sophistication and effort that Heritage programs are applying to preserving biological diversity, you understand that fast food restaurant's slogan "Where's the beef?" We are putting a lot of muscle into preserving biological diversity, and I would like to share that knowledge and enthusiasm for doing that.

I really don't have anything further to say. I'll open it up for questions.

[The prepared statement of Mr. Boone follows:]



Maryland Department of Natural Resources

Forest, Park and Wildlife Service
Tawes State Office Building
Annapolis, Maryland 21401

William Donald Schaefer
Governor

Torrey C. Brown, M.D.
Secretary

Donald E. MacLauchlan
Director

Hearing on the National Biological Diversity Conservation
and Environmental Research Act, H.R. 4335

United States House of Representatives
Science, Space, and Technology Subcommittee on
Natural Resources, Agriculture Research, and Environment

Testimony of D. Daniel Boone
Coordinator
Maryland Natural Heritage Program

June 30, 1988

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Mr. Chairman, members of the Subcommittee, my name is Daniel Boone and I am the Coordinator for the State of Maryland's Natural Heritage Program. I offer this testimony in support of your efforts to establish a national policy for the conservation of biological diversity.

Unlike my pioneer namesake, I do not battle the wilderness. To the contrary, I am involved in the fight to save the last fragments of our great natural heritage.

If a "war" is a fitting analogy to our Nation's struggle to preserve biological diversity, then each state's Natural Heritage Program would be equivalent to a M.A.S.H. unit. However, our care is administered to the elements of biological diversity - the species and ecosystems that comprise our natural heritage. While the "war" is far from being over, our resources and manpower are very limited compared to the onslaught of casualties and victims to which we tend daily. The Heritage Program's strategy is "triage" - to maximize the number of survivors.

In each of our state's "battlefields" the Natural Heritage Program has amassed considerable information and knowledge about the distribution and status of the elements of biological diversity - the only group to maintain such comprehensive records. All Natural Heritage Programs use a standardized methodology and a factual, balanced information system with which to collect and store data. The staff is composed of scientific experts trained in several biological disciplines, though the core is nearly always represented by a botanist, zoologist, and ecologist. Most programs have been in place now for several years. Maryland, for example, was initiated in 1979. This longevity not only enables the staff to obtain intricate, detailed knowledge of their state's biological diversity, but also facilitates multi-institutional cooperation that allows us to achieve together what we couldn't attain individually.

A major theme of my testimony, Mr. Chairman, is that the network of nearly 50 state Natural Heritage Programs comprises this country's frontline of protection for biological diversity. Our information and expertise are an unparalleled and virtually unrecognized resource in this Nation's struggle to conserve its dwindling biological diversity. With an army of well over 250 scientists and resource professionals devoted to the identification and preservation of biological diversity, an appropriate Federal strategy should coordinate through the Heritage network all efforts involved in the collection, synthesis, and dissemination of data and information required to understand and protect biological diversity.

The Natural Heritage Programs and many Federal agencies are benefitting from coordination and mutual cooperation. This relationship fulfills the Federal agencies need for the

information and expertise that the Heritage Programs provide, while at the same time expands the knowledge and information about the states' biological diversity. In Maryland, for example, the Natural Heritage Program receives substantial Federal funding through the Coastal Zone Management Program (N.O.A.A.) to identify areas harboring endangered species or other significant habitats, and to work with local jurisdictions to encourage the protection of these areas. Similarly, the Bureau of Land Management provides funding for field inventory and evaluation of wetlands in Maryland's coal-mining region (via State funding arrangements with the Office of Surface Mining).

Institutional cooperation between the Heritage Program and the U.S. Fish and Wildlife Service is also very strong in Maryland, especially for endangered species research. Likewise, the Maryland Natural Heritage Program works closely with most of the management units of the National Park Service, and maintains a Memorandum of Understanding with the Service's National Natural Landmarks Program. Our coordination with staff of the Corps of Engineers for environmental review of wetlands permits is frequent and productive. Despite this mutually complementary institutional coordination, there needs to be even greater cooperation between the Heritage Programs and Federal agencies to preserve biological diversity and natural environments. The establishment of a national policy to conserve biological diversity, as provided in H.R. 4335, will certainly foster and increase the institutional alliances mentioned above.

Presently, few of the land-use decisions which can affect biological diversity are sanctioned or regulated by a Federal agency. The vast majority of these decisions are reviewed and/or regulated by state agencies or local jurisdictions. Natural Heritage Programs are increasingly active and effective participants in the decision-making process of state governments. Furthermore, many Heritage Programs are beginning to provide their information and technical assistance to local jurisdictions. However, what is really needed to enhance biological conservation in this country are incentives and guidelines that encourage private landowners and local administrations to protect areas identified by Natural Heritage Programs.

Federal legislation that provides revenue to acquire open space habitat, or that funds the protection of nongame or endangered species, could be amended to designate a portion of their yearly appropriations for purchasing lands, waters, or interest therein which are important to the conservation of biological diversity. Greater incentives to local jurisdictions that receive financial assistance for protecting open space could be created by offering a special cost-share match to cover the expense of acquisition of sites with significant biological diversity.

Hundreds of areas harboring important biological diversity are in the database of each Natural Heritage Program. Maryland, for instance, has identified over 300 privately-owned sites. Although there is now a million dollars a year available to protect these important habitats from the State's Heritage Conservation Fund, and private conservation groups like The Nature Conservancy raise nearly an equal amount, this level of funding can only protect a small fraction of the sites of known importance to maintaining our State's biological diversity. Consequently, a greatly increased level of funding will be necessary in order to offer private landowners adequate compensation for their interest in these areas. Federal legislation addressing this critical funding need will provide the quickest and most effective solution.

Mr. Chairman, the protection of our nation's biological diversity requires the cooperation of Federal, state and local governments; not only with each other, but especially with the private landowners and managers who directly influence most of our land. To halt the biological impoverishment of our country, we need to collectively develop a comprehensive and coordinated strategy to increase public understanding of the issues. We also need better methods of expanding and sharing the knowledge required for the maintenance of biological diversity. However, time is not on our side. We need to ensure that our actions to conserve biological diversity are carefully balanced and highly effective.

There is so much to do that all groups and agencies concerned with biological diversity should be able to participate and contribute without any duplication of effort. However, it will be essential for this partnership to define their areas of expertise, as well as determine where their contribution will be the greatest.

I have already stated that Natural Heritage Programs excel in the collection and management of biological data, and increasingly Heritage Programs are becoming the lead group in planning and implementing protection strategies for biological diversity. However, we do not have the collective resources to support basic environmental research in genetics, biochemistry, physiology, or systematics. Nor do Heritage Programs have the training or funding to support effective public education regarding the importance of biological diversity. These priorities should be coordinated nationally, perhaps as major responsibilities of the proposed National Center for Biological Diversity.

The state Natural Heritage Programs stand ready to help establish national priorities and provide leadership for acquisition and implementation of knowledge concerning the

biological resources of the Nation. Through our hard work and expertise, we deserve to be in the membership of the governing board of the Center, as well as be represented on the Scientific Advisory Committee. I believe that our practical experience with biological diversity, its problems and needs, would greatly help these advisory and coordinating bodies.

I thank you, Mr. Chairman, for inviting me to make these suggestions and for your consideration of my remarks. I have attached supplemental information about the Maryland Natural Heritage Program in order to provide a more detailed explanation of the organization and scope of its activities.

Natural Heritage Program is Designed To Protect Wildlife and Plant Life

The Natural Heritage Program is the lead unit within DNR for the identification and protection of the State's rare plant and wildlife species and natural areas. These highly significant species and habitats are essential elements of Maryland's natural heritage and their loss threatens the state's biological and ecological integrity.

The Heritage Program concentrates its efforts to identify, monitor, manage and protect threatened and endangered species and the best remaining examples of habitats which represent the diversity of undisturbed natural ecosystems in Maryland.

In FY 1987, senior staff from the program played key roles in a DNR committee which culminated in the approval and enactment of completely revised threatened and endangered species regulations for Maryland. Staff botanists and zoologists spent over a year reviewing hundreds of species for designation as threatened, endangered, or in need of conservation.

The regulations designate 32 natural heritage areas, 101 endangered and 28 threatened plant species and 33 endangered and five threatened animals species, as well as 20 animal species in need of conservation. These regulations also recognize 138 plants and 17 animals as 'endangered extirpated.' These species have disappeared from Maryland since the ratification of the U.S. Constitution and their contribution to our rich natural heritage may be lost forever.

The program works cooperatively with private and public conservation agencies to protect natural areas and rare species habitats. Within the Chesapeake Bay Critical Area, the Heritage Program assists local jurisdictions in the identification and conservation of important habitats for fish, plants and wildlife. The program provided information and technical assistance for nearly 80 habitat protection areas, natural heritage areas and habitats of local significance to local jurisdictions within the critical area. The program also helps to direct the Heritage Conservation Fund, which is administered by Program Open Space, to purchase interests in lands necessary for the preservation of species

and habitats important to Maryland's natural diversity.

The heritage program provides its information and expertise to assist the Maryland Environmental Trust, Chesapeake Bay Foundation, The Nature Conservancy, and the Natural Lands Trust in their landowner notification, registry, easement and acquisition efforts. The program is also beginning to assist with the management and interpretation of public and private lands dedicated to the preservation of Maryland's biological and ecological diversity.

Comprised of four interrelated functions devoted to the collection, management, analysis, and implementation of ecological information about rare species and natural areas, the program has these complimentary elements: inventory, data base management, environment review and protection planning and stewardship.

Inventory researches and records the status, distribution and ecology of the state's plants, animals and habitats, especially rare species and natural areas. Data Base Management files, updates and analyzes the program's information, particularly the inventory data. Environmental review supplies heritage information to land use decision-makers, ensuring that significant natural resources are not lost due to lack of knowledge.

Protection planning and stewardship is the most recent and most all encompassing of the heritage functions. This effort incorporates site specific details (i.e. species lists, boundaries, ownership, etc.), ecological descriptions and management recommendations into a plan for each significant natural area identified by the inventory.

The stewardship components will then provide management assistance and advice in order to perpetuate the significant features/conditions of the special habitats.

Protection planning and stewardship, through liaisons with many private and public agencies and local jurisdictions, then coordinates a multi-faceted conservation strategy at a level of protection appropriate for each significant habitat area. ★



The New Birdman of Alcatraz

National Wildlife Federation

In the folklore of American prisons, the Birdman of Alcatraz was Robert Stroud, a convicted murderer who became an expert on avian diseases. Today Alcatraz is abandoned, and the National Park Service leads tourists through old cell blocks. And, according to *National Wildlife* magazine, the Park Service has enlisted the services of a research biologist to help manage the island's flourishing birdlife — a man who has become the new Birdman of Alcatraz.

Stroud's spiritual successor is Ray Pierotti, a scientist from the University of California at Berkeley who was originally attracted to Alcatraz by his interest in avian diets. Very quickly, however, park rangers learned of his knowledge and began to solicit his expertise when questions arose involving the island's birds.

One of the greatest pleasures Pierotti enjoys is witnessing the rebirth of wildlife on Alcatraz. Long before Alcatraz catered to felons, the 12-acre island served as a major seabird colony — perhaps the most important in Northern California. In fact, the Spanish word *alcatraz* means pelican, and the name dates from the days when the island served as a haven for thousands of pelicans, gulls, cormorants and other sea birds.

In the 1850's however, the United States began using Alcatraz as both federal fort and a military prison, forcing the birds to move elsewhere up and down the coast of California. ★

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NATURAL HERITAGE PROGRAMS

INFORMATION METHODS: WHY THE HERITAGE PROGRAMS WORK

by Robert E. Jenkins
Vice President for Science Programs
The Nature Conservancy

The Nature Conservancy has its origins in the scientific community. From its beginnings, the organization has been involved in biological and ecological surveys (which were referred to generally as "natural areas inventories"), having conducted or participated in almost every one—from the local to the national. Most of the early efforts were of limited value—partly because they were underpowered for the task and partly because no one had yet found a workable approach, conceptual or methodological, to cataloging the complexities of natural systems.

Since 1974, our performance in this field has improved tremendously thanks to the establishment and continuous growth of the state natural heritage programs. These inventories now nearly blanket the U.S. and, through the efforts of our International Program, extend into a number of Latin American countries as "conservation data centers." Whatever the name, each of these programs is, as we have so often put it: "a permanent and dynamic atlas and data bank on the existence, characteristics, numbers, condition, status, location, and distribution of occurrences of the elements of natural biological and ecological diversity." (As ponderous as it sounds, this is a simple and accurate definition of the concept!)

Natural heritage programs and conservation data centers have eclipsed predecessor inventories through their mastery of biological data and their capacity to use those data in a wide array of applications: in research, in setting conservation priorities, in natural resource management, and in development planning. There are manifold reasons for this success. Among the most significant are the following:

Focused goal: Many earlier inventories suffered from objectives that were unclear or overly general. By seeking to gather data on a number of distinctly different subjects—scenery, recreational values, and

natural resources in addition to biological characteristics—they muddled their results. Recognition that the Conservancy's main business is to *conserve biological (and ecological) diversity*, and that this is also the correct object of the inventories, brought clarity to the identification task. Most meaningfully, it simplified the classification, inventory, and analysis of a vast body of potentially important data.

Focused method: The focused goal allowed us to make a breakthrough in methodology. The Conservancy reversed the virtually universal procedure of inventorying selected sites for their natural values. In place of "sites" as the functional unit, the heritage programs substituted "elements" of biological and ecological diversity: the individual plants, animals, and complexes thereof (primarily terrestrial and aquatic community or ecosystem types) that we are seeking to protect. By listing, classifying, and characterizing the *elements* rather than the natural areas where they occur, the inventories can determine relative endangerment, track down the finest occurrence on the landscape, and identify conservation priorities in the state. The system makes it possible for heritage scientists to compile a list of places that support "the last of the least, and the best of the rest"—those elements that are rare, endangered, or otherwise sensitive to destruction.

Multi-institutional cooperation: The heritage inventories are carried out primarily by state agencies. The Conservancy supplies the methodology, trains and initially supervises the program's staff, offers technical support, and coordinates data exchanges and other forms of multi-state collaboration over the longer run. This cooperation for the common benefit has been crucial: the job was too big for the Conservancy to do alone, but its methods and resources have helped the states organize workable programs

without reinventing the wheel. In some states, the scope of cooperation is even broader, with staff or funding furnished by several agencies or organizations. In terms of data gathering and data use, the network of institutional cooperators becomes very broad indeed—involving universities, corporations, federal agencies, and other conservation groups (to name only a few).

Successive approximation: The heritage programs are constantly evolving, and with that evolution comes modification and realignment. "Successive approximation" is the continual refinement of our methods—and of our actual information collection and management. The same general idea is sometimes expressed in terms of "incrementalism," "hierarchical prioritization," "skewed information systems," or "iterative feedback." This may completely cloud the issue for some, but others will recognize the concept by its alternate names. On the level of methods development, our techniques change as we design, agonize over, and apply particular techniques—then alter them as experience dictates. Each new methodological approximation is thus a systematic improvement over the last. In terms of data gathering and management, successive approximation operates through continual realignment of priorities. We regularly analyze each inventory's content, identifying gaps in our knowledge and determining their relative importance. This greatly enhances efficiency by retargeting limited resources.

Factual, balanced information system: In addition to those mentioned above, there are at least two system attributes that deserve attention. First is the development of a *balanced information system* in which the bulk of the data is consigned to carefully structured manual files and maps, and the computer is reserved primarily for terse records and automated sorting tasks. Such a system employs the computer to answer simple inquiries while using staff expertise and less structured manual data for complex applications. Second is the system's *strong factual basis*: we record facts, not an interpretation of those facts. Because the data are not distorted through the filter of any particular set of criteria as to significance, the information can be applied by the broadest possible range of users. By the same token, previously collected information does not lose its usefulness as our perceptions of significance change.

Standardization: Standardizing the inventories is absolutely necessary for orderly methodological refinement, free exchange of data, efficient research and development investment, and accommodation of heritage-data users. The challenge has been to develop systems that are sufficiently impressive to overcome the impulse for each program to invent for itself—and then prefer whatever it invented. Despite the obstacles, the heritage network demonstrates a high degree of standardization. Standards are maintainable in part because we take a hierarchical approach to them as well. Absolute uniformity is necessary in defining the most fundamental "units of record," but a modicum of inconsistency in less basic terms isn't fatal. Therefore, while we are careful to maintain standards most strictly where they really matter, we don't try everyone's patience by insisting on standards in peripheral parts of the data system. Other factors at work in maintaining standards include comprehensive training, tight early supervision, constantly refined operating manuals, frequent communication, camaraderie among the staffs, practical requirements for data exchange, dogged persistence, a system that actually works, and a certain amount of intransigence on the part of the national heritage task force.

Stated simply, the object of our efforts has been mastery of the facts. We have learned how to organize information for use by the many institutions making decisions that affect the landscape and the biota within it. We are working now to enlarge the sphere of applications so that someday soon, no judgment that could benefit from the heritage resource will be made without it.

Ideally, more and more parties will join as users of, and contributors to, the heritage network—employing it as an aid to their activities and returning new data and other forms of support to ensure its advancement. Cooperation among institutions, a key to the success of the heritage inventories to date, will assume ever greater significance in the years to come. What we can't achieve individually, we will achieve together: the continuance and expansion of a system that makes knowledge work for the benefit of all.

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Mr. SCHEUER. The Subcommittee has just convened in "executive session" and we've decided to accept your invitation for a field trip to Annapolis.

Mr. BOONE. Super.

Mr. SCHEUER. Thank you very much for the invitation. All right. Congresswoman Claudine Schneider of Rhode Island.

Ms. SCHNEIDER. We are confusing him, you know, we can't talk about too many states at once here, particularly when Rhode Island is so exemplary in their work toward protecting the environment.

But now, on to the meat of the matter. It has come to my attention that there was a man who made a butterfly collection in the early sixties when he was a child. The state of Ohio then went about to do a similar kind of a survey, a collection, in the same area, and in that same area they only found 42 out of the 64 species of butterflies that this gentleman had in his collection.

Now, this seems like a rather shocking decline in diversity that is taking place without a whole lot of attention being paid to it. I wondered how typical might this kind of reduction be as we look through the various states. Dr. Raven, with the research that you've been doing, and Dr. Lovejoy; who would like to comment on that? Mr. Boone?

Mr. BOONE. I'll take a crack at it. I don't want to demean the rate of tropical forest loss and the importance to biological diversity that represents, but all you need to do is to drive 30 miles from here in any direction and you'll see what we're doing to biological diversity in this area. The loss of habitat and species is as great here. It's not on the same order of magnitude by any means, but the rate is very similar. We're losing a lot of species and that's a very common pattern everywhere.

Dr. LOVEJOY. I guess that question goes to the very heart of what this legislation is trying to address; we sort of know that it's typical but we don't have the data to say that it is.

Ms. SCHNEIDER. Right. And the data, as we clearly have indicated in this legislation and through the testimony today, is the first step—knowledge is power, but it is only powerful if you then use it.

Mr. SCHEUER. I think it's only fair that you give attribution to Dr. Buffington for having told that to us today.

Ms. SCHNEIDER. But of course. Far be it from me to borrow from any of these words of wisdom here today.

But what does concern me is the will to act on this. Yes, we can collect the data, and granted, our hearing here today is to focus on the need for coming up with a mechanism whereby we do have the data. The next step, of course, Dr. Buffington, we will have the ball in your court and that of other federal agencies to make sure that the will to provide for the maintenance of biological diversity be implemented.

The other question I wanted to ask Mr. Boone had to do with—you mentioned that your state spends \$700,000 annually, is that right?

Mr. BOONE. That's general funds plus special funds that we get from some federal grant monies.

Ms. SCHNEIDER. And how much of that money is being used for training programs, or do you take some of that money and leverage it with matching grants from the private sector?

Mr. BOONE. Secretary Richardson had an excellent point. I think there is a tremendous shortage of trained naturalists out there. Our staff is sort of large and we tend to siphon off some of the talent from other states. There definitely needs to be incentives for universities and educational institutions to emphasize and train people.

Ms. SCHNEIDER. As a state group, though, are you providing any of those incentives?

Mr. BOONE. I would say yes. The staff that we hire, I feel, obtain a tremendous amount of training in what it takes to observe biological diversity and learning about natural history. We don't have a cooperative agreement with—well, I am funding, through the University of Maryland, a graduate student to look at endemic invertebrates in caves in western Maryland. There just aren't enough resources to do everything, and that's where your legislation can help that.

Ms. SCHNEIDER. Dr. Raven, I wonder if you could elaborate a little bit about how your institution interacts with other institutions or agencies. For example, your interaction with the Smithsonian, and sharing of information and data.

Dr. RAVEN. Probably the most important example of what we do for what we're talking about today, is that we are the coordinating center of a project called The Flora of North America Program, which is funded by the National Science Foundation and by the Pew Foundation, the Packard Foundation and other private agencies. This is a coordinated program which involves about 20 universities and research centers, and which is providing a database for the plants of North America. Over the next 12 years it will work through the plants of United States and Canada and will provide a modern, up-to-date treatment of them. That is highly cooperative, involves local participation, involves national funding and national coordination and, I am pleased to say, is directly coordinated by agreement with the State Heritage System of the Nature Conservancy.

But I do think it illustrates a point that I want to emphasize. We have heard repeatedly that the Fish and Wildlife Service, the Forest Service, the Park Service, the State Heritage Program deal with vertebrates and flowering plants, so let's just start with them. There is not now any means of generating computerized maps of the distributions of vertebrates or flowering plants generally in the United States. We don't have any means of displaying their total ranges. We don't have, for the most part, an ongoing effort to find out how many kinds there are; much less do we have any means of assessing how they're going up or how they're going down or how they're dealing locally.

In order to provide a really scientific, important, centralized database even on those well-known groups, it is necessary to involve the museums of the United States, the university groups, the scientists who are actually doing the work on the organisms. All of the agencies and all of the programs that you hear described are basically re-combining data and using locally-based people to add infor-

mation from those places. They are very powerful and they're very appropriate, but I want to point out that from my point of view, I would hope that you wouldn't miss the fact that the National Center should be a way of generating information, of finding new information, of finding where the holes are, and of really providing a scientifically based national fount of information from which all of these things could radiate.

Because they each start from their own standpoint. You can look at threatened or endangered species from the standpoint of the Fish and Wildlife Service; you can pick them out, they do excellent studies of them, but it will never, given the timeframes that have been discussed, lead to the construction of a national matrix that will allow you to understand the whole pattern everywhere. The same can be said about the State Heritage Programs, wonderful as they are.

The item that I think is badly needed to complete the whole system, is a National Center which is generating information interactively with all of these other agencies in an easily accessible form which really involves the scientists who are doing the work, and doesn't simply use the information that they are producing, and that will allow us to go on adding information now.

As I said before, if you go beyond plants and vertebrates, the situation can only be described as a tragedy. For butterflies and some groups of beetles we do know something, but for most groups of invertebrates we scarcely even have a competent specialist in the United States to identify them.

I think the essential thing about the Center is that it has to give us a national perspective on what we have and what we need, and to find a way of enhancing our capabilities in those areas, of training specialists in those areas, of giving them opportunities for employment, because that will never happen by the aggregate of all of the wonderful things that you hear described here and which I subscribe to, all of them, heartily. But nevertheless, without a central, positive generation of data in a systematic way and an assessment of what we need nationally, it will never add up to that.

And I would hope that that wouldn't be lost sight of. It's very easy to start viewing the Center, as I gather the OTA report may do (which I haven't seen) as a way of bolstering lots of excellent things that are going on. And I just invite you to look at the excellent things that we need and which are not going on.

Ms. SCHNEIDER. Well, let me say that your response was most comprehensive, and the testimony of each of the members, I think, has surely enhanced our case for our legislation. I am most confident that we will be able to, with your help, garner the kind of support among our colleagues and hopefully among the American people that we will need not only to move a new idea into action, but also to finance it.

Thank you very much. I have no further questions, Mr. Chairman.

Mr. SCHEUER. Thank you, Congresswoman Schneider. Dr. Raven, you've been telling us that in order to preserve biological diversity we've got to know a lot more about it. My question is, do we really have to know all about the plants and animals in an area to conserve them? Why can't we just designate an area, a park, or a

refuge and assume that when we do that everything in it, in the self-contained area, will be preserved and enhanced and protected?

In other words, do we have to have all of that body of knowledge in order to say, this is an area where we ought to protect all those living things? Boom, let's go for it.

Dr. RAVEN. If we did, obviously the wonderful works of the Nature Conservancy and the Fish and Wildlife Service and many federal agencies would be wasted. Obviously, those plans, as I said, are highly effective and extremely important in helping us to conserve diversity.

But as I also said at the beginning of my testimony, the two things that we're really missing are an articulated, agreed-upon, cooperatively organized, national policy, and a means for generating, enhancing and improving the national effort in understanding biological diversity so that we can do a better and better job. It's not to say that these efforts are either wrong-minded or not of extreme importance, because they certainly are, but what we're trying to talk about is using all aspects of our community, and of our ability to gather and use knowledge in the best way possible so that those efforts can be still better.

Mr. SCHEUER. We have discussed that a major way to protect biological diversity is through habitat protection, through establishment of refuges and sanctuaries and so forth. In other words, through ecosystem acquisition, land acquisition. I suppose I ought to ask Dr. Buffington, do all of the federal agencies, or have all the federal agencies working together produced a priorities list for purchases of land for the purposes of biodiversity protection?

Dr. BUFFINGTON. I don't know about other federal agencies; the Fish and Wildlife Service does have a priority system which is examined in our appropriations process. And one of the categories which is reviewed in terms of establishing priorities for purchase does deal with what might broadly be phrased biodiversity.

Mr. SCHEUER. One of your priorities?

Dr. BUFFINGTON. That's correct. We obviously have some—we have special-purpose refuges that might be geared towards waterfowl or may be geared towards a particular endangered species. But in terms of our annual list of lands that we seek to acquire, they are prioritized by a complex process, and one of the categories does include biodiversity.

Mr. SCHEUER. How about the other agencies?

Dr. BUFFINGTON. I have no idea.

Mr. SCHEUER. A question for the whole panel. In your opinion, what are the most important things that the federal government should be doing now in terms of biological diversity data acquisition and data coordination, to produce a common database that everybody can plug into and everybody can interact with? Yes, Dr. Lovejoy.

Dr. LOVEJOY. I think in one sense it's a relatively simple, although large, exercise. One needs to draw together all those agencies, public and private, that are already involved in the exercise, and in the process of discussion, determine what the missing parts of the puzzle are. And the missing parts of the puzzle will consist of two kinds; one, retrieving information that already exists in museum collections or in literature or in the minds of certain ex-

perts, and then there's going to need to be an important second part which is a lot of field work—going out and checking things, looking for new things, getting material to scientific specialists to determine whether there are undescribed things. So it's a large job, but each piece of it is conceptually rather simple. It's a difficult orchestration job.

I'd just like to say that last week we heard all about the greenhouse effect and I'm delighted to see it getting the attention it really deserves. The greatest impact of the greenhouse effect is going to be in the temperate and boreal regions.

Mr. SCHEUER. Temperate and which regions?

Dr. LOVEJOY. And boreal. Farther north, coniferous forests. And what is going to happen is that the climatic conditions to which plant and animal species are adapted will move away from where those plant and animal species currently are; that will endanger biological diversity and national parks and reserves, and it's perfectly conceivable that with the warming that has already occurred that some of that may have started. But we do not have the information to say whether that has happened.

Mr. FLICKER. I'd like to comment on what has been happening at the state level and I think it provides something of a model of what could happen at the federal level.

The first thing that's happening at the state level is, they create a depository of information which is generally the state Natural Heritage System where the biological diversity information is available in a neutral setting. It's critical that these data be in a depository and that the data remain non-politicized. The information is sort of information for the sake of knowledge that anybody has access to.

We've heard a lot of talk here today about the Endangered Species Act and the problem with listing species and the problem with moving that along. One of the main reasons there's a problem in listing species is that the data have been politicized, regulation is attached to data-gathering. The data-gathering is hampered because there's an automatic regulation that goes with it.

The State Heritage Program—

Mr. SCHEUER. What kind of regulation?

Mr. FLICKER. Once a species is listed, there are a lot of legal implications as to what can happen on the land where that species exists. As a result, the data-gathering and the data processing becomes very politicized and you get very, very tied up as a result. And we are seeing that constantly with the Endangered Species Act.

The State Heritage Programs have been adamant about keeping their data non-politicized so that everyone participates in the system—utilities, power companies, timber companies, state agencies, universities. They help fund the Heritage Programs because they're not threatened by the data. Everybody wants good information. It's non-politicized data. It's critical that whatever depository is established at the federal level remain a non-politicized center.

The second thing that happens—

Mr. SCHEUER. How do you provide for that in language? I can understand how you provide for it in tough, enlightened leadership, but how do you write language that data will not be politicized?

Mr. FLICKER. You keep the data separate from regulation. You have data-gathering as an independent function from the regulatory side of the business. The regulatory body may use that data, but the information gathering source—Dan Boone here has nothing to do with regulating anybody in Maryland; he just gathers information. It's God and motherhood, good information that anybody can use.

Mr. SCHEUER. "Just the facts, ma'am."

Mr. FLICKER. That's right, just the facts. Exactly. That's critical to making it successful.

The second thing that happens at the state level is, you need a mandate to protect natural areas. You need a mandate to protect biological diversity. At the state level they're called State Nature Preserve Systems. There are close to 20 states now that have adopted State Nature Preserve Acts to protect areas for the purpose of preserving biological diversity. You simply need that mandate.

Right now at the federal level you have various agencies that have a partial function preserving natural areas but it's generally secondary to some other primary function, be it game species or be it recreation use or something else. There's no mandate at the federal level to preserve natural areas or biological diversity.

And then thirdly, you need an ability to manage those areas once they're protected, and both the protection and the stewardship involve money. You've just got to put money in the system, and precious little money is being put into it right now.

Mr. SCHEUER. Very interesting. I'd like to ask any of you who wish to respond a question. If you were director of a new national entity with a mandate to coordinate biological database activities in the United States, with the goal of making these activities in the U.S. useful for conservation of biological diversity purposes—sustainable use and the like—how would you begin? Dr. Raven.

Dr. RAVEN. Briefly along the lines I just outlined, first, to use the best available scientific talent and scientific information to generate a state-of-the-art databank on vertebrates and flowering plants which had national implications; to use that databank to find gaps in groups, in our knowledge of groups and of areas to get out and survey those more precisely; and then to take steps to put in place a mechanism for measuring trends in the abundance and distributions that you had mapped.

Secondly, for all other groups of organisms, to take as many of them as possible to that level as soon as possible. In other words, to put in place a national survey of the other groups, starting probably with butterflies, certain groups of beetles, mosquitos and a few that are well known for one reason or another, to put them on the same basis. And finally, to identify groups for which there was not an adequate information base, not an adequate number of specialists, and to find ways through education, through cooperative arrangements with educational institutions, museums and other kinds of institutions, to train specialists who could deal competently with the other groups of organisms so as to raise our national capability to a point where we could meaningfully understand the complexes of organisms that really run the ecosystems that we depend on.

I would build this database in an ongoing way so that it would be continually added to and so that it would provide employment for the specialists that we need and which we are missing now. And I would build it in such a way that it would be compatible with and available for the Fish and Wildlife Service, the Park Service, the Forest Service, the Nature Conservancy, and sustain and supplement their efforts.

In addition, you would use a kind of a moral leadership role to try to do what you could to increase funding for the very appropriate and comprehensive and proper activities of the more specialized agencies, public and private, that are addressing the same problem.

Dr. BUFFINGTON. Mr. Chairman, it might be helpful if I provided a few technical comments on the care and feeding of large databases; a subject that at various points in my career I have gotten caught up in.

We claim to be an information society, but information is extremely expensive, it's one of the most expensive things that we as a society buy.

Mr. SCHEUER. The only thing that's more expensive than having the information is not having the information.

Ms. SCHNEIDER. Would the gentleman yield on that? I really need to reinforce that, having been part of this full Committee, which has been responsible this year alone I believe in introducing at least six different provisions for federal agencies to gather data and transfer information. And one easy example where I can tell you the cost-benefit analysis specifically comes out in favor of gathering information and disseminating is in the whole area of hazardous wastes.

None of my constituents are aware of the fact that we have the technological capability to recycle or reuse anywhere between 50 and 73 percent of all of our hazardous wastes. And yet, we continue to dispose of all those hazardous wastes into landfills; some are still going into ocean dumping. Once constituents and businesses have that information—like 3M and like some of my smaller jewelry manufacturers—it is amazing that they have the will to take that information and use it. And in the end, they're telling me that it is more cost-effective to reduce their wastes than it is to have to pay fines by EPA or whatever.

So example after example, whether it's hazardous wastes or other issues, we find that providing constituents and the general public with information is a very cost-effective means and much more cost-effective than not taking those actions.

Mr. SCHEUER. Just to give one more example, with all of the palaver that has taken place about how to dispose of human wastes from urban areas—putting it on barges and letting them sail around the world and all that—we still don't know what is the least environmentally-degrading way of processing human waste. We don't know whether it's incineration, we don't know whether it's spreading it out all over the land, we don't know whether it's ocean dumping.

This Subcommittee, I say with some sense of satisfaction, has for years been a lone voice in the wilderness urging EPA and NOAA to get their act together and to conduct joint research on the least

environmentally-degrading way of getting rid of urban waste, mostly human waste, and they haven't done it and we still don't know. And we're paying dearly for not knowing.

So, Dr. Buffington, you've heard a few little asterisks on your comment about knowledge being expensive, and I think we've made a pretty good case that it may be expensive, but from the long-run point of view, if you look at the lifetime cycle cost of knowledge over a period of time, it's a hell of a lot cheaper to have the knowledge than not to have the knowledge, and just go bumbling through like an elephant crashing through the jungle.

Dr. BUFFINGTON. Well, I was attempting to provide some specifics for the record, if you'd like them.

Mr. SCHEUER. Please do.

Dr. BUFFINGTON. I think in terms of planning, you can anticipate that a special-purpose national database which might have several hundred and several thousand entries, you can anticipate that it's going to take you about five years from inception to the point where you have something that you can show somebody. And probably for planning purposes, you can anticipate that is going to cost you about a million dollars, and those are very general numbers that I just draw from my own experience.

Maintaining a database like that is probably going to cost you about \$100,000 a year in terms of keeping it debugged, providing user services, keeping your data current. And I just provide that as a footnote to your comments, Mr. Chairman.

Mr. SCHEUER. Yes, Mr. Boone?

Mr. BOONE. I think that the Nature Conservancy and Heritage Programs are already providing much of that service. The Fish and Wildlife Service uses our data extensively. We have regional meetings where their staff comes and they primarily use the Heritage Programs' databases to help determine their listing and funding priorities. So we're doing it.

Mr. SCHEUER. So, regardless of how we got there, what you're saying is this process may have grown like topsy, but at this point in time we seem to have a mutually agreed-on database and data collection system that all of the groups, public and private, can plug into, can interact with, can interface, and that we're not likely to spin off into several directions at one time, and have database systems that can't communicate with each other.

Mr. BOONE. I believe the basic design can be functioning for many users in many different ways. It's very flexible and yet very comprehensive. I think it's an excellent design, that other agencies are drawing data from. We're being used, so I think that's proof.

Mr. SCHEUER. All right. That suggests the next question, and that is the following. This bill provides \$25 million over three years, essentially for database-oriented activities. Toward what activities would any of you direct these dollars? What products would it be reasonable to expect from a National Center for Biological Diversity on an annual budget of \$8 or \$8.5 million? And what examples can any of you point to in your own institutions that show what kind of products we can get and should get and ought to get for this kind of money, this order of magnitude of funding? Is that the right question to follow on with yours?

Mr. FLICKER. That's a very good question and I'm sure other panelists have other things. But there's really two principal things that could come out of it. One is funding to help the State Heritage Programs continue the product they're already producing, and that's the kind of product like we got yesterday—very specific kinds of things, an EIS review and the kinds of things that Dan Boone has been talking about being done at the local level already.

The second thing are the kinds of things that Dr. Raven has so eloquently spoken about. These Heritage Programs are extremely limited because we don't have the funding to expand the classification system, to do the taxonomic work, and to do all the kinds of scientific research that he referred to that would expand this system. The Heritage Programs are the depository of the information, and we use the information that all other sources have gathered. It's simply a depository of the information.

We need to expand that information base, and that's really what Dr. Raven is talking about, and we agree with him totally. It would be extremely helpful to have a national center, a national database that would be a national depository of information. And then we need to spend money contracting with universities and museums to expand that knowledge base in all the ways that he has talked about.

Mr. SCHEUER. Is \$25 million over three years the right level? Is it too much, is it too little?

Mr. FLICKER. We estimate that to do the kinds of things we'd like to do on the national level it would take about \$10 million a year. We're close, we're in the same order of magnitude.

Mr. SCHEUER. Yes. Yes, Dr. Raven?

Dr. RAVEN. It might be worth saying that the Flora of North America Program has about 20 cooperating agencies and will produce a set of books about the plants of the United States and Canada and a computerized database on their characteristics and ranges by states only. But the characteristics that are in the flora are estimated to cost about a million dollars a year for about 15 years, and if you look at that in perspective you would have to conclude that it's somewhere in the ballpark.

Now I fully subscribe to the idea of helping state Heritage Programs and analogous matters, not to mention all the other important related things that are going on in federal agencies, but if you think of the Center as centering around central functions then I would have to conclude—you know, you can only find out by experimentation—but I would have to conclude that you're somewhere in the right region by analogy with what we know.

Dr. LOVEJOY. The only question I would raise with respect to this amount is that when you start thinking about the invertebrate part of the equation it may be too small.

Dr. RAVEN. You would, though, need some time—you'd have to start by making a plan, a very careful plan for how you were going to deal with invertebrates, and my idea, both of the Center and of the Interagency Task Force that the bill also sets up, would be that they would work towards the plan and then begin to put specific numbers on it.

I would also expect that the National Science Foundation, which I think is under-represented in the legislation as it stands now,

would be making grants for some of those matters. For example, invertebrate surveys.

And I might even add as a footnote on that, that specifically with reference to Hawaii, which we've talked about several times, the MacArthur Foundation has made a grant to the Bishop Museum to call together specialists in October and set in place a plan, a strategic plan for surveying terrestrial invertebrates in Hawaii. That's the kind of thing that I visualize going on nationally, that's the kind of thing that will feed back into the Nature Conservancy.

Mr. SCHEUER. Dr. Raven, it's appropriate to mention, I suppose at this point, that next January this subcommittee will be out in Hawaii. We will be having hearings on biological diversity in which Congressman Dan Akaka will play a major role, a leadership role, as he has been playing for many, many years. And any input that you'd like to give us on what you think we ought to consider in that Hawaii hearing, which coincidentally is next January, we'd love to get your thoughts and work with you on it.

Dr. RAVEN. I'm sure we're all available to be of service in Hawaii next January.

Mr. SCHEUER. Good. Who knows, you may get an invitation to come out there.

[Pause.]

Okay, some invitations will be forthcoming. [Laughter.]

Now we all heard Secretary Richardson talking about the importance of education, public education, so I have to address these remarks to Dr. Lovejoy for the Smithsonian to consider.

It seems to me that the issue of man and his environment, the issue of man living in serenity and his salubrious relationship with his environment has really come of age in the last decade or two. Certainly the importance of maintaining our biodiversity globally as well as in the Washington regional areas, as Dan Boone was telling us, and Hawaii as we've heard, is an idea sort of whose time has come.

Now, you have a wonderful Air and Space Museum, you have a Natural History Museum, you have the old first Smithsonian building. But I have felt for some time, and I am reinforced in that feeling today after Secretary Richardson's little prod to us all that education is important and ought to be an added factor in this Center, that there is an unmet role, an unmet mission that is facing the Smithsonian; namely, having some educational impact in showing the American people an exhibit, a museum or something that would relate them to man and his environment, man and his urban environment, his ex-urban environment, his rural environment, his wilderness environment, his ocean environment, his lake environment, his forest environment, his grazing land environment, his crop land environment. How we are degrading it, how we are enhancing it, what the mistakes have been, what we've learned; how we can live in serenity with our environment. How we can live at peace with our animal and plant environment. What should we be doing about our tropical rain forests, what should we be doing about endangered species, the elephants, the rhinos, all of the endangered bird species that we've heard about in Hawaii, the endangered species that Mr. Boone tells us are within a 50 or 60-mile radius of where we're sitting now.

Don't you think that would be a mission that it's time for the Smithsonian to think about?

Dr. LOVEJOY. Mr. Chairman, I went to a secondary school that required everybody to take a course in biology and as each year—

Mr. SCHEUER. And I guarantee you that we would teach that course in biology far differently today than when either you or I took biology; in your case a couple of decades ago, in my case quite a few more decades ago. But wouldn't we be more on the *qui vive* today, and design a course in biology that would encompass the kinds of biological diversity concerns that you've heard today that wouldn't have been present in a course that you would have taken 20 or 25 years ago?

Dr. LOVEJOY. I agree.

Mr. SCHEUER. Isn't this an idea whose time has come, to teach biology but to teach more than biology; to teach conservation, to teach serenity, to teach a relationship between man and his planet that wasn't in your biology course, I wouldn't think, 20 years ago and certainly wasn't in mine 50 years ago?

Dr. LOVEJOY. Actually, there was a lot in it. And the point I was leading to is that a knowledge about these kinds of things is a requisite to being a good citizen today.

Mr. SCHEUER. I agree totally.

Dr. LOVEJOY. And the Smithsonian, in the upper reaches, is very interested in these kinds of topics, and I would, just for starters, be delighted to invite you and your committee for an expedition through our new underground rain forest which addresses some of these issues.

Mr. SCHEUER. And where is that?

Dr. LOVEJOY. That's in the S. Dillon Ripley Center underneath the new Haupt Garden.

Mr. SCHEUER. Here in Washington?

Miss SCHNEIDER. If the gentleman would yield—

Mr. SCHEUER. Oh, this is the one that I got an invitation to come and see the opening.

Miss SCHNEIDER. Yes, and you missed it but I didn't. And it was terrific, and I think he's being very humble in his response to your question. I couldn't help but smile, because quite frankly, the whole concept that you have articulated is one that is reflected in the exhibit that the Smithsonian currently has including hands-on experience. I think that one of the best aspects of that was the display of the interior of an individual's home. And in that home you could see the parquet wooden floors that came from the tropical rain forest, you could see some of the other fruits, the orange juice, the biological diversity in utilitarian objects. It's terrific.

Mr. SCHEUER. Well, the reason I didn't come is because there was somebody that I want to come with, and I think there's somebody that you ought to come with. In my case it's Mr. Dukakis, the Governor of Massachusetts, and in your case it might be a fellow by the name of Bush. I'd like to get these two putative leadership types involved, I'd like to get a public showing by them that this is important. I've been in touch with Governor Dukakis on this subject; I know my colleague is going to be in touch with Mr. Bush, and I think it would be great if each of them could show up and

maybe make it a little media event. Let the public know that these are deep concerns of theirs; that beyond the trade bill, the budget deficit, the corruption in the Defense Department, there are long-term ethical and moral questions of how man lives in peace with his planet earth. And both of these men have the intelligence, the integrity, the moral stuff that should make it easy for them to show this concern, it should come naturally to them.

This is all by way of saying why I didn't come on the opening. I'm scheduling my own opening, and I invite Claudine Schneider to bring that other great, truly fine American also to the Smithsonian, and maybe I'll schedule a little pre-meeting meeting to look at the landscape.

But what I am talking about is a major museum; not one exhibit on a tropical rain forest—that's very, very important. But how about the desert environment, how about the arctic environment, how about the urban and suburban environment, how about the environment that Mr. Boone is talking about, this radius of 50 or 60 miles from Washington? This is a vast subject and I think it deserves comprehensive, multi-disciplinary treatment. And I'm delighted to accept your invitation.

And let me just say by way of footnote, if you are looking for a site, there is a little spit of land in New York City that sticks out into Long Island Sound, 175 acres. It's called Fort Totten. The Army controls it. It's a beautiful green emerald in New York City. I'll send you a photograph of it. Surrounded by 300 degrees at least, maybe 325 degrees, by water. And the Army, the Defense Department, is interested in bringing in some educational uses that are compatible with their mission, that relate to the water, the sky, the air, and the land. I can assure you with a depth of feeling that the Congressman representing Fort Totten would give you his unstinting cooperation in perhaps working out a plan for the location of a Smithsonian Museum on Man and His Environment: the Challenge of Preservation of Global Biodiversity. And I'll be happy to discuss all that with you.

It has been a superb panel. We've been here for three hours, way beyond our allotted time. We are grateful to all five of you. Please expect us to be picking your brains and consulting with you in the weeks and months ahead. We're very grateful for this wonderful testimony. The hearing is adjourned.

[Whereupon, at 12:28 p.m., the hearing was adjourned.]

APPENDIX

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

Congressional Testimony

on Behalf of Biodiversity Bill

by

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Since 1650, 200 birds and mammals and a much larger but undocumented number of plants and invertebrates have become extinct. Some authors are suggesting that 1 million species may become extinct by the end of this century. The Endangered Species Act of 1973 was an excellent attempt to reduce the number of extinctions and has resulted in species being saved. However, there were 608 species listed as endangered or threatened in 1976—three years after passage of the Endangered Species Act. Less than one percent of these species had formal recovery plans. Today we have 991 species listed as endangered or threatened and despite impressive work on the part of very dedicated scientists, conservationists, and politicians, less than 30% of these species have formal recovery plans. If present trends continue and our focus remains on the most critically endangered species, we will fight battle after battle to save individual species, winning very few of them, and additional species will decline to the point where they are endangered.

It is a sad commentary that the current widespread practice of "Emergency Room Conservation" channels most of the economic and emotional support for the protection of biological diversity into those few species least likely to benefit from it. While heroic efforts are sometimes successful in reversing the downward trend of a rare species (e.g., Owens River pupfish [*Cyprinodon radiosus*] [Moyle 1976] and whooping crane [*Grus americana*]), their cost is often staggering and fraught with the potential for failure (e.g., California condor, *Gymnogyps californianus*, and black-footed ferret, *Mustela nigripes*). The last members of these critically endangered populations may be eliminated by a chance event (Raffaele 1977, Wetmore 1925).

The difficulty of single species recovery programs is perhaps best illustrated by the California condor, a species that has been at the top of the list in terms of recovery efforts since the passage of the Endangered Species Act but has continued to decline in numbers until today there are none in the wild. The only hope for survival that this magnificent bird has lies with the 28 individuals in captivity at zoos in San Diego and Los Angeles. Despite an intensive research effort going back nearly 5 decades, it was not until 1985 that we were able to state that a percentage of the condor population was dying because of a known mortality factor (Wiemeyer et al. 1988). In spite of large amounts of money being spent and high quality research being conducted, it is very difficult to identify and correct those factors responsible for the endangerment of species. As a result, because of our focus on endangered species, we are not getting ahead of the extinction curve.

More importantly, as Pitelka (1981) so eloquently stated, such species-oriented efforts suffer a lack of perspective when measured against the objective of preserving overall biological diversity on the planet. This latter objective is better served by using a systems approach to preserving species and biological diversity, rather than relying on costly and labor-intensive efforts to manage individual species (Nisbet 1978).

History gives us many examples of widespread and common, if not abundant, species that are now extinct or endangered. Who would have predicted the extinction of the passenger pigeon (*Ectopistes migratorius*), so numerous it obscured the sky in the mid-1800's? The plains bison (*Bison bison*), once widespread across North America, has been virtually eliminated from its natural habitat and exists today only in small herds in parks, refuges, and game farms. More recently we have seen the dusky

seaside sparrow (*Ammodramus maritimus nigrescens*) decline from perhaps 2000 birds in 1968 to only 6 males (5 in captivity, 1 in the wild) in 1980 (USFWS 1980). The last captive bird died in the summer of 1987. If history is any guide, without an integrated systems-level conservation program, a number of species currently abundant will soon join the ranks of endangered or extinct species.

The issue we are facing today is how to protect what remains of worldwide biological diversity. I am not talking about preventing natural extinctions--only those resulting from man's actions. We should not give up on the endangered species, the basket cases, but we should realize that we cannot save them all. We cannot even save those that are becoming extinct solely due to man's activities. If our objective is to protect biological diversity, the problem is how to best accomplish this goal within a reasonable time frame and budget. It is my belief that before we move to protect biological diversity we first must know where the gaps are in our present network of preserves. Research activities in California and Hawaii, I believe, provide some insight on how we might proceed.

To assess adequacy of protection, Hawaiian researchers mapped the ranges of endangered forest bird species, that group they thought should be the best protected, and plotted their distribution in relation to existing preserves. They found that existing preserves included less than 10% of areas where these species occurred (Scott et al. 1987).

In California Karen Klubnikin used Kuchler's (1977) vegetation types plotted against existing preserves to determine the acreage of each plant community in California and the percentage of each in existing preserves. This simple but powerful method revealed some unexpected results. There was very uneven protection of the 31 vegetation types in the state. For

example, 95% of alpine habitats were in reserves, but less than 1% of the species-rich riparian habitat was protected.

Clearly there are gaps in our present network of protected areas. I believe that the Biodiversity Bill provides a mechanism by which federal agencies working closely with state and private conservation groups can fill many of those gaps. It is important that in doing so we do not duplicate efforts already underway by the Nature Conservancy, other private groups, as well as state and Federal agencies, and that the leadership for this endeavor be firmly placed with a single agency. The first step in the process is to take advantage of existing information on occurrence of plant associations and those animal species (vertebrates and butterflies) for which we have biologically defensible information.

This information, when combined with maps showing landownership, existing preserve areas, and land zoning, could be used to identify gaps in our existing network of preserves. Questions that can be answered using a geographical information system and these data include the following: 1) what portion of areas of high species richness for endemic species, threatened, endangered and sensitive species, game species, and rare species are protected; 2) what percent of each plant association or cover type is protected; 3) are existing preserve areas adequate to protect those species and communities that might be negatively impacted by future activities of man and his commensals; and, 4) if existing preserves and management areas are inadequate, what gaps need to be filled to create an adequate set of preserves?

When these questions are answered, we would have a verifiable estimate of how well biodiversity has been protected. Purchases of land and protective easements could be made to fill the gaps in our managed areas

network with the objective of protecting biological diversity rather than simply because they benefit a single species.

The occurrence of plant associations and animals could be verified for perhaps 1% of the sites. Information obtained during these verification surveys would provide the first set of data for the national biological survey requested by so many people. More detailed sampling efforts for all plants and animals would be implemented on an as-needed basis. Taxonomic updates and identification of new species would be done on a continuing basis as time and money allowed. However, conservation needs would be identified in a hierarchical fashion starting by identifying gaps in preserve coverage of vegetation types and areas of high animal species richness using presently available information.

In conclusion, the current emphasis on conservation of endangered species is diverting most conservation energy and resources to species on the brink of extinction (Scott et al. 1987; Hutto et al. 1987; Csuti et al. 1987). In the final analysis, the success of efforts to preserve biological diversity will be judged on the number of surviving species in the year 2100, not on whether we save the California condor or black-footed ferret in the next decade (Scott et al. 1987). We need to act now to develop a strategy to insure that the greatest number of species possible will survive. The Biodiversity Bill provides an opportunity to do that. The first step would be to identify gaps in the current network of preserves. And having identified them, protect those unprotected areas of highest species richness in order to protect future biological diversity. I believe this approach to the problem is the most efficient and cost-effective way to retain the maximum biological diversity in the minimum

area. This could be done using existing information. The tools and data for such an analysis are available.

This integrated systems approach to saving biodiversity is being used in Idaho. Based on refinement of results of this pilot project, a nationwide application of the approach could be completed before the end of the next decade.

References

- Klubnikin, K. 1979. An analysis of the distribution of park and preserve systems relative to vegetation types in California. Unpubl. M.S. thesis, California State Univ., Fullerton.
- Moyle, P. B. 1976. Inland Fishes of California. University of California Press, Berkeley.
- Nisbet, I. C. T. 1978. Concluding remarks on the problems of managing endangered birds. Pages 447-451 in S. A. Temple, ed., Endangered Birds. University of Wisconsin Press, Madison.
- Pitelka, F. A. 1981. The Condor case: An uphill struggle in a downhill crush. Auk 98:634-635.
- Raffaele, H. A. 1977. Comments on the extinction of *Loxigilla portoricensis grandis* in St. Kitts, Lesser Antilles. Condor 79:389-390.
- Scott, J. M., B. Csuti, J. D. Jacobi, and J. E. Estes. 1987. Species richness: a geographic approach to protecting future biological diversity. BioScience 37:782-788.
- _____. 1980. Future of dusky may depend on captive propagation. Endangered Species Technical Bulletin 5(4):1-6.
- Scott, J. M., C. B. Kepler, P. Stine, H. Little, and K. Taketa. 1987. Protecting endangered forest birds in Hawaii: the development of a conservation strategy. Pages 348-363 in R. T. McCabe, ed., Transactions of the 56th North American Wildlife and Natural Resources Conference, Wildlife Management Institute, Washington, D. C.
- U.S. Fish and Wildlife Service. Future of dusky may depend on captive propagation. Endangered Species Technical Bulletin 5(4):1-6.

- Wetmore, A. 1925. Bird life among lava rock and coral sand. Nat. Geogr. Mag. 18(July):76-108.
- Wiemeyer, S. N., J. M. Scott, M. P. Anderson, P. H. Bloom, and C. J. Stafford. 1988. Environmental Contaminants in California Condors. J. Wildlife Management 52(2):238-247.

STATEMENT FOR THE RECORD

OF

THE NATIONAL FOREST PRODUCTS ASSOCIATION

ON

H.R. 4335, THE NATIONAL BIOLOGICAL DIVERSITY CONSERVATION
AND ENVIRONMENTAL RESEARCH ACT

FOR THE

HOUSE SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND
ENVIRONMENT

JUNE 30, 1988

The National Forest Products Association (NFPA) is a national trade association representing the forest products industry. NFPA represents over 750 member companies and allied organizations. Legislation implementing land management policies affecting private and public lands, such as H.R. 4335, could have a major impact on our members. We appreciate the opportunity to provide our views on H.R. 4335.

Biological diversity is a concept which is threaded throughout the laws, regulations, and programs at the federal, state, and private level in the United States. More importantly, conservation of biological diversity is effectively practiced in forest management activities throughout the country.

There are currently, according to the 1987 Office of Technology Assessment (OTA) report entitled, "Technologies to Maintain Biological Diversity," 29 federal laws relating to biological diversity maintenance. It should be noted that this list does not include those federal laws relating to restoration of biological diversity such as: the revegetation provision of the Surface Mining Control and Reclamation Act (Public Law 95-87); or the conservation reserve provision of the Food Security Act of 1985 (Public Law 99-198). Any failure to conserve this nation's biological diversity is not for lack of a law.

-2-

Also, according to the OTA report, there are nearly 400 million acres of public land under Federal ecosystem conservation programs. This enormous land base is controlled by several agencies under numerous and diverse systems and philosophies; each has the necessary legislated tools to be successful in conserving biological diversity.

The full potential of existing Federal programs and legislation relating to the conservation of biological diversity have yet to be realized. The U.S. Forest Service has over 800 scientists conducting research at the present time. Much of this research is directed towards improving the understanding of ecological relationships, which is the key to conserving biological diversity. Additional legislation would not serve to advance any existing programs.

On privately owned land, the forest industry has worked extensively with state natural heritage programs, the Nature Conservancy, and many other organizations and agencies to identify the best and most significant sites to be managed for the conservation of biological diversity. Such sites range from the 20 acre stand of virgin Atlantic White Cedar provided recently by Robbins Lumber Company in Appleton, Maine, to the more than 60,000 acre Okefenokee Swamp in Georgia donated by Weyerhaeuser Company and Union Camp Corporation. Hundreds of other examples of voluntary donations by private forest landowners are found across the nation. The OTA report

-3-

recognizes the importance and effectiveness of these private land programs.

NFPA fully endorses the concept of biological diversity. However, we do not support H.R. 4335.

NFPA offers the committee the following suggestions for improving conservation of biological diversity: (1) give the federal agencies the time they require to implement existing laws and programs; (2) increase the public awareness through existing educational programs; (3) support proven state and private efforts, such as state natural heritage programs; and (4) encourage the on-going research by supporting programs such as Competitive Grants.

Finally, in this age of massive federal budget deficits we urge the committee to not enact new legislation calling for additional funding which would create yet another unnecessary layer of bureaucracy.

STATEMENT FROM THE NEW YORK STATE BIOLOGICAL SURVEY
CONCERNING THE PROPOSED
NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND
ENVIRONMENTAL RESEARCH ACT (H. R. 4335)

The New York State Legislature authorized the formation of a natural history survey in 1836, initiating what became one of the most comprehensive efforts of American science in the nineteenth century. This was the beginning of the New York State Biological Survey, which has been the focus of over 150 years of uninterrupted study of the plant and animal resources of the State. The Survey, now a part of the State Museum in Albany, maintains extensive collections in mycology, botany, zoology, and paleontology, and large data files stored electronically or in other formats. These collections are widely used in the preparation of monographs and revisions, in floristic and faunistic studies, for service identifications, and for education. Our collections together with comparable ones elsewhere are used to document changes in the State's biota and as benchmarks against which circumstances in the future can be gauged. The Biological Survey's original mission, which was to survey, collect, and describe scientifically all the plants and animals of the State, was broadened under State Education Law in 1945 to include scientific research and cooperation with the federal government, other states, educational institutions, and industry in the discovery, analysis, and dissemination of

scientific information.

Today, the Biological Survey is the only office in New York State government that has broad responsibility for study and documentation of the State's biological diversity. The Survey is the primary source of information about the State's flora and fauna for the Departments of Environmental Conservation, Health, Agriculture and Markets, and other government agencies. Moreover, State Education Law established that the State Museum is to serve as the repository for scientific specimens belonging to the State, unless such items fall under other jurisdictions. The Survey has produced numerous publications, many of them book-length, about the biota of the State, and its scientists publish regularly in national and international professional journals.

Survey research projects perhaps most relevant to the purposes of the National Biological Diversity Conservation and Environmental Research Act include studies into the distribution, natural history, biology, extirpation, rarity, and pest status of the State's plant and animal species and how species indigenous to New York fit into worldwide evolutionary and biogeographic patterns. Survey ecologists investigate the reasons for current and past patterns of distribution and abundance, particularly resource use by aquatic and terrestrial plants and animals, while accumulating baseline information for use by environmental managers and others concerned with environmental quality. Some of this work provides a historical basis for understanding the current biota and for predicting future biotic changes with

changing climate and human activities.

As this brief summary shows, there has been a long history of intensive and centralized study of biological diversity in New York by the State Biological Survey. However, one fact beyond question has been established in this 150 years of experience: We have only scratched the surface and remain extremely ignorant of our vast, complex, and ever changing biota. We still lack the baseline data needed to answer many elementary questions concerning the diversity of our biota. For many groups of organisms we do not know all of what exists in the State, and for some we know almost nothing. We do not know how much we are losing or gaining over time and why, or what the consequences of natural or man-induced biotic change will be for ecosystem functioning and human welfare.

Three disciplines, all of them well studied in New York compared with other states, provide solid examples of our present state of ignorance.

There are, by conservative estimates, about 65,000 known species of fungi worldwide, plus perhaps another 30,000 species yet to be described and named. New York State hired America's first professional mycologist, C. H. Peck, in 1867, and by the end of his 47-year tenure he had collected and described about 8000 New York fungi, including 2700 species new to science. Due to refinements in the science of mycology, only about 50-60% of his new taxa are today regarded as valid. Since Peck's time, many new fungi have been recorded from New York State, but still

no comprehensive list exists.

Even before the establishment of New York's natural history survey in 1836, amateur and professional botanists were actively studying and cataloging the plants of the State. Despite over two centuries of devoted botanical research by hundreds of individuals, new native and naturalized plants are still being discovered, and rediscoveries of species thought to have been extirpated are frequent. In 1842-1843, the final report of John Torrey, staff botanist of the natural history survey, was published. Today, it remains the only completed flora of the State, recording 1610 species of trees, shrubs, and herbs, nearly 10% of which are regarded as naturalized from sources outside the State. Eighty-two years later, a checklist produced by the State Museum recorded 2650 species, a 65% increase over Torrey's list, with over 30% of them regarded as naturalized. Today, 146 years after publication of the first flora, 3400 species are recognized - over twice as many as found in Torrey's work, with over 40% of the flora regarded as naturalized. It is clear that New York's flora is growing and changing rapidly.

New York State hired America's first professional entomologist, Asa Fitch, in 1854. The previous year, Fitch estimated that about 3,000 species of insects from the United States had been classified and described and that there were another 27,000 species still unknown. He further estimated that there were 600,000 species worldwide and that only about a sixth of them were named and described. The only published list of New

York's insects was completed in 1926, and it records a total of 14,420 species, over half the total number Fitch estimated for the entire United States. By 1948, the United States Department of Agriculture estimated that 82,500 species of insects had already been described for North America north of Mexico, and that there were 686,000 known worldwide. A more recent estimate indicates that there could be as many as 30 million species of insects worldwide. It is possible that we know less than a thirtieth of all insect species! Moreover, we have not yet even fully described the insect diversity present in New York State.

The National Biological Diversity Conservation and Environmental Research Act would profoundly influence the work of the New York State Biological Survey. By designating the conservation of biological diversity a national priority, the validity of the Survey's work would be enhanced significantly. The development of a nationally coordinated effort to collect, synthesize, and disseminate data for the understanding of biological diversity and the availability of federal support for basic environmental research in genetics, biochemistry, physiology, ecology, systematics, and biogeography would assist the Biological Survey in accomplishing its goals for New York State. It has taken over a century and a half to appreciate fully the daunting scope of biological survey work. It has taken even longer to acquire a fundamental appreciation of the importance and desirability for this type of work for understanding and solving environmental problems of regional,

national, and global scale. Yet we find ourselves at a moment in history when support in all forms - statutory, political, administrative, collaborative, and financial - is at a low ebb in reference to actual needs.

The National Biological Diversity Act provides new and invigorating philosophical support for studies of plant and animal diversity, as well as a source of funds for such studies. Even more significant would be the support rendered by a nationally coordinated plan that utilizes and adds to existing resources. The New York State Biological Survey is administratively in a position to cooperate with and take advantage of relevant projects of national and global scale. Scientists involved in surveys of biological diversity have long argued that the flora and fauna do not respect political boundaries, and that the most sensible, satisfying, economical, and efficient way to study diversity is on the largest possible geographic scale. The savings in effort, time, and funds resulting from a nationally coordinated effort would be great, freeing resources that could be applied toward surveys of organisms that have been long ignored. Many groups of organisms have never been investigated because they are not obviously important economically or medically, although all species play a significant role at some level in ecosystem operation. Shared expertise, facilities, and databases would allow all organisms to be surveyed at reduced effort and expense. Also, for many groups, there is no or only one expert in the world; the only way

to make headway on such groups is through an effort coordinated on a national or global scale. The New York State Biological Survey is poised to do its part to aid a national effort on behalf of biological diversity conservation and environmental research, and it expects that the returns to the State will be of surpassing value.

Norton G. Miller

Chief Scientist, New York State Biological Survey

17 June 1988

"Assessing the Adequacy of Biological Diversity Databases"
 Text of address to the Ecological Society of America
 University of California, Davis
 15 August 1988

Kerry S. Walter and Donald A. Falk¹

1. Introduction: Structural Problems with Biological Diversity Databases

A vast amount of information of all kinds about natural systems is continually generated and stored all over the world. Moreover, the volume of such data is increasing exponentially, as our technology and information needs expand. Although it is difficult to estimate how much biological information is coming in, a comparison with the earth sciences may put things in perspective: the meteorological data from the Nimbus satellites add 4800 megabytes of data daily, equivalent to approximately 2.4 million typed pages every day.

This phenomenal storehouse records weather patterns on a twice-daily basis, including temperature, pressure, wind velocity and direction, development of weather systems, and a number of other parameters at eight different altitudes for a grid of reference points 400 km apart. This meteorological information, along with Landsat imagery, satellite-generated soil maps, and data from other monitoring systems, is of great interest to those involved in the maintenance of biological diversity.

Thankfully, recently-developed laser disk technology allows us to store that information compactly and conveniently; each day's worth of data occupies 1-1/2 12" diameter disks which can be maintained and retrieved with relative ease.

However, developing or accessing global biological data sets is not so easy, for several reasons:

a. First, biological systems are inherently complex. Unlike weather data which may reduce to a relatively small number of globally-comparable physical parameters, the number of variables associated with the description of biological systems is almost overwhelmingly large. By the time one has attempted to incorporate data on species distributions for all five kingdoms, patterns of genetic variation, population densities

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K. Walter and D. Falk

"Assessing the Adequacy of Biological Diversity Databases"

15 August 1988

page 2

and dynamics, community competition, nutrient and enervetic cycles, and ecological interactions for even a geographically small area, the data set will have grown phenomenally large. Add exponents of complexity for the enormous differences among the major types of global ecosystems, the logistical problems associated with surveying marine and arctic environments, and the sheer scale of problems inherent in sampling any one of these dimensions globally, and it is easy to appreciate the Broddingnagian immensity of such a task. Moreover, only certain types of biological data - such as dominant plant community composition and distribution - can be readily collected by satellite. Much, if not most, of the data - as Terry Irwin and his colleagues have so elegantly shown - must be collected on the ground, one step at a time.

b. Biological data sets are correspondingly multi-leveled and complicated. In addition to the sheer volume of data to be collected, stored, and retrieved, biological data are often complex in ways that make processing by computer difficult. For instance, many biological data are largely textual and descriptive, not numeric; computers are great number crunchers but less capable of manipulating and analyzing text data. Moreover, biological data sets often have a high degree of infra-record variability, making the design of field and file structures to handle them more difficult. To take an extremely simple example, consider the variation possible in merely recording a Latin binomial or trinomial. Scientific names of plant species may be anywhere from 8 characters long to over 75; synonymy, hybridization, and infraspecific variation may introduce multiple levels of variability and interpretation making the creation of a uniform data set nearly impossible. Distribution data may be even more complex, as populations may be endemic to one site or globally cosmopolitan. The emergence of database management software and AI systems capable of incorporating variable - length fields and multiple values per field enables some of these complexities to be dealt with. But there is still a long way to go.

c. There are few consistent standards for the description and quantification of biological data. Although we think of things such as taxonomic nomenclature as being well described by a set of universally agreed-upon rules, in practice the number of types of data with such consistency is exceedingly small. Even within systems of taxonomic description there are large disparities in biological nomenclature, treatment of infraspecific taxa, interspecific hybrids and variants, and anthropogenic taxa and other recombinants - let alone the nearly complete absence of standards for describing and classifying communities, ecosystems, landscapes, and so forth. At least the contributors to the International Botanical Code know whom to argue with.

d. There are similarly few standards for coding and computerization of biological data. Information is being held in hundreds of different locations, using different machines, running different software, grouping

K. Walter and D. Falk

"Assessing the Adequacy of Biological Diversity Databases"

15 August 1988

page 3

and coding data by different methods of organization. One immediate consequence is that much of the present data on biological diversity is really inaccessible, or accessible only with such great time and effort as to make it barely worthwhile. Problems of data system incompatibility thus rank very highly among problems to be solved, especially given the importance of information networks to be described below. Often databases with similar (but slightly different) scope or coding protocols can suffer either from data redundancy or near redundancy (which is even more dangerous), leading to unnoticed gaps in the data sets as well as difficulties of communication. Other obstacles to data sharing and communication include proprietary interests restricting access to potentially useful data (e.g. for economically important germplasm), and poorly thought - out data structures that do not reflect the needs of end users.

e. Representation of many levels of biological hierarchy is inadequate.

A fifth layer of difficulty characteristic of present biological databases is that of inadequately including data at different levels of biological hierarchy or organization (that is, on the levels of allele, gene, individual, population, species, community, ecosystem, and so on, as well as on nutrient flows and energetics). There is an overwhelming bias in what we think of as "biological diversity databases" to species (taxon) - level information, to the relative neglect of both higher (communities and ecosystems) and lower (population and other infraspecific) levels of organization. For instance, if we are truly concerned with genetic diversity as the ultimate meaning of the catch-all phrase "biological diversity", then should not our databases reflect what we know of clinal and ecotypic variation, or genetic architecture at the population level? After all, it is well documented that the degree of genetic variation within many described taxa is greater than that between taxa in other groups; there is not a simple correspondence between taxonomic rank and genetic distance. Moreover, since in most cases the adaptive (or even ecological) significance of much genetic or morphological variation is unknown, it seems presumptuous to talk about databases concerned with "genetic diversity" on one hand, and to then focus so heavily on merely listing ranked taxa.

2. Current Biological Diversity Databases.

What, then, do our current biological data sets look like, and how well do they represent global diversity at all levels of hierarchy? Space and time limitations prevent us from compiling an exhaustive list or offering a detailed analysis, but for illustration we enumerate a few of the major databases for plants, specially those organized along taxonomic or species-distribution lines. The extent of overlap and redundancy -and the potential for confusion - will become immediately apparent.

Among the major U.S. governmental data sets are:

GRIN (Germplasm Resources Information Network) and
GAPP (Germplasm Accession Priority Program), both maintained by the
Agricultural Research Service of the US Department of Agriculture.
These databases include records on over 600,000 plant
"varieties" maintained in the U.S.

K. Walter and D. Falk

"Assessing the Adequacy of Biological Diversity Databases"

15 August 1988

page 4

US Fish and Wildlife Service, over 2,500 plant listings under the Endangered Species Act
Land managing agency databases (US Forest Service, Park Service, Bureau of Land Management)

Major non-governmental databases include:

The Nature Conservancy, whose data center network constitutes one of the most extensive systems in existence documenting species and community distribution

Conservation Monitoring Centre (IUCN), with approximately 35,000 plant taxa records. Other IUCN data sets pertain to the Conservation for Development Centre and the Botanic Gardens Conservation Secretariat (BGCS).

International Board of Plant Genetic Resources (IBPGR)

Conservation Data Centers (CD's) of The Nature Conservancy
Man and the Biosphere (MAB)

Continental, national, or regional floristic data sets include:

European Documentation System (EDS) and Flora Europea

PRECIS (South Africa), the world leader in country - wide computerized floristic and natural history data sets, tracking some 24,000 taxa.

TROPICOS and Flora North America (FNA), Missouri Botanical Garden, including three major types of files and bibliography on the estimated 17,000 - 20,000 plant taxa found north of Mexico.

Kartesz and Kartesz's Synonymy Checklist of the U.S. Flora

State level floras such as the Illinois Natural History Survey, the premier state system incorporating a geographic information system (GIS).

Nomenclatural and bibliographic data sets:

Index Kewensis (Royal Botanic Gardens, Kew), including all plant names published worldwide, approximately half a million listings.

Gray Index (Harvard University), listing all New World Plant names

BIOSIS (approximately 6 million records, 40 thousand added each month from 9 thousand sources.

AGRICOLA (approximately 2 million agricultural bibliographic references, 10 thousand new listings every month).

AGRIS Intl. (primarily non-U.S. agricultural bibliography of 850 thousand records, 3500 added per month).

Data sets on offsite collections of plants:

IUCN/BGCS, tracking all endangered populations in cultivation worldwide.

BG-BASE Systems (Center for Plant Conservation), with 100 thousand records of plants in cultivation by the end of 1988.

Miscellaneous databases:

Ecological Information Network (with 1500 ESA members).

Individually - designed and maintained data sets - literally thousands - kept by university researchers, local conservation groups, state agencies.

K. Walter and D. Falk

"Assessing the Adequacy of Biological Diversity Databases"

15 August 1988

page 5

And these are only a few of the largest, just for plant taxa. There has obviously been an enormous proliferation of databases, with huge overlaps and partial (and unpredictable) redundancies; differences in hardware, software, and coding protocols; laborious procedures for data exchange, if in fact exchange is possible at all; and spotty representation of higher and lower levels of organization of biological diversity. Despite the traditional prediction, when extraterrestrials do finally land on Planet Earth, their first demand is most likely to be, "take me to your subdirectory".

3. Technological Change and the Trend to Data Networks

Another stimulus to this proliferation, of course, has been rapid technological change, - one is cautious about saying "evolution" although the model probably fits at a crude level - within the field of computer systems themselves. There is no need to belabor the dramatic rate of technical change, which results in this year's cutting edge becoming next year's obsolescence. But it is important to consider the ramifications of the unparalleled spread of microcomputer technology, for this technology has - or should have - a major impact on how we conceive of global biodiversity databases. Microcomputers, and most especially microcomputer networks, make possible a fundamentally different way of organizing biological databases, i.e. into networks rather than by the accumulation of massive centralized data sets. One example of the impact of this technological shift - and the dangers of ignoring it - is the rise and fall of the Plant Sciences Data Center (PSDC). Originally conceived as a central mainframe database and service center for all U.S. botanic gardens to list their accessions, PSDC promised to make computer record keeping available to botanic gardens and arboreta at a time (early 1970's) when few such institutions owned or had access to computer systems otherwise. But as the number of subscribers grew and the data set itself became more massive, processing and response time became unacceptably long for many gardens, and PSDC began to collapse under its own weight. Then, as microcomputers became available, affordable, and understandable, one garden after another dropped out of the system to develop its own, leaving PSDC with only a few subscribers and no claim to comprehensiveness.

This is not to say the mainframe databases will not play a role in future study and conservation of biodiversity. but the future may well lie not in the creation of a massive centralized data set -- the sort of Greco-Roman Empire model - but rather in the interactive networking of hundreds of smaller, compatible systems. If this is so, then what may have to be centralized is primarily the listing of these linked data sets (a "database of databases"), coding protocols, and methods of access.

4. Major Classes of Biological Databases

All of this suggests that we should do a much better job of organizing our thinking about biological databases, especially those developed or used for critical needs such as agriculture and conservation. Taking into account i) the inherent complexities of biological data sets described in Part I above, and ii) the need to develop better systems of communication among databases described in Part 2 and 3, we suggest that there are four major classes of biological databases, corresponding to different groups of basic data and purpose.

K. Walter and D. Falk

"Assessing the Adequacy of Biological Diversity Databases"

15 August 1988

page 6

a. Baseline biological data sets. These are the basic data about natural systems themselves, what we know about the natural world per se: the distribution, movement, and magnitude of species, and populations genetic variability, community associations, ecosystem interactions - in short, all the data that describes what we know about what is "out there", at each level of biological hierarchy.

b. Data on threats to survival of any of these levels of biological hierarchy. Biodiversity data, after all, are not simply of academic interest; they are purposefully assembled and maintained to help us in our efforts to prevent extinctions. Therefore, to identify conservation priorities it is essential to know what species (or populations, or ecotypes, or community types) are most immediately threatened with extinction. Although this seems almost self-evident, there are very few database systems in use globally that deal with threat or decline in a sophisticated manner. Even the best of them, such as the U.S. national database of The Nature Conservancy or the United States Fish and Wildlife Service, track only a relatively small number of fields pertaining directly to the degree or immediacy of threat. Partly in response to the need for this kind of data, the Center for Plant Conservation recently completed a survey of 120 regional botanists who were asked to assess the time to possible extinction of a universe of about 900 rare US species. Other national systems quantify numbers of populations or individuals, but because the Center deals with critically endangered species we had a need for a better grasp of the time dimension as well. Thus in effect these data address the question (for US plant species), "How much time do we have left to save species x?" The results of our survey indicate that as may as 680 native US plant taxa are at risk of extinction within ten years. 73% of these plants are concentrated in five states or territories (Hawaii, California, Texas, Florida, and Puerto Rico). Needless to say, data of this kind are of enormous importance in helping a national conservation program determine its priorities. Data sets on endangerment could include specific threats to populations, rate of national and anthropogenic decline, and other information necessary to evaluate the causes and severity of threats to diversity.

c. Data sets on conservation actions and management. Just as it is important to understand threats to diversity, it is likewise important to know what we are doing to protect it. Conservation is thus our attempt to address the collision between data sets of the first (biodiversity) and second (threats) categories. We need a better grasp of this information to avoid duplication of effort, as well as to ensure that our programs correspond to conservation priorities. And yet, few major databases link conservation action to needs; fewer still incorporate detailed data about conservation management techniques, research, and methods. And there are virtually no internationally agreed - upon systems for describing all of this work, undertaken by thousands of international, national, subnational and private agencies.

K. Walter and D. Falk

"Assessing the Adequacy of Biological Diversity Databases"

15 August 1988

page 7

d. Data sets describing biological diversity as a natural resource. For many people conservation of biodiversity is not an end in itself; rather, it must be justified or at least placed in perspective as protecting resources that may be of human benefit, especially agriculturally or economically. This is a fundamental watershed in basic attitudes toward nature, and in the long run it does us very little good to ignore it or hope it will go away. Thus if we are to build support for our efforts to protect global biodiversity, we must appeal to the interests of those who value nature as a "natural resource", and demonstrate that conservation and a sustainable economy are a necessary partnership. In order to build this constituency, we will thus be compelled to marshal economic data as well as philosophical or purely biological arguments. After all, these are the very corporations and governments that are causing or allowing the destruction described in our "threats to diversity" databases. So if we are to win them over, we need hard and persuasive data regarding the economic role of genetic variation, species diversity, and ecosystem services. Conservationists in developing nations in particular need this kind of data set to rationalize their preservation of a long-term resource that many in their countries would exploit for much-needed short term gain.

5. Recommendations for the Organization of Biological Diversity Databases.

The foregoing analysis is intended to provide a framework for the improvement of our thinking about database systems. Such observations, however, are of little practical use unless accompanied by concrete recommendations for the organization of actual database programs. We thus offer following suggestions to guide the creation or enhancement of national database programs:

a. Existing data sets should be classified according to the groupings described in Part 4. (baseline biological data, threats, conservation action, and biodiversity as natural resource). This relatively simple exercise will immediately highlight the areas requiring more complete documentation. For instance, there may be many overlapping lists of occurrences of rare plants in a region but little or no documentation of the causes or immediacy of threat, rendering the design of effective conservation programs difficult.

b. Interactive networks of data systems should be emphasized over the creation of a massive, centralized database covering all aspects of biodiversity. The latter is probably not only impossible, but also likely to be cumbersome, expensive, and inflexible as well. What should be centralized is the listing of those interactive databases, along with the fields of information and the coding protocols used by each. The proposed National Center for Biological Diversity and Environmental Research may be the ideal location for such a "database of databases".

c. Because of the emphasis on networks, compatibility and widely accepted standards are of paramount importance. If we will indeed be living in a world of networked micros and minis, then data standards and protocols are of immense importance. Some recent efforts in this direction, such as the International Transfer Format (ITF) developed under the auspices of the

K. Walter and D. Falk

"Assessing the Adequacy of Biological Diversity Databases"

15 August 1988

page 8

Taxonomic Databases Working Group for botanical databases, have made important progress in devising coding protocols and procedures for transferring information from one database to another. The Center for Plant Conservation is also presently coordinating a project to improve the compatibility of databases maintained by or at the Center, The Nature Conservancy, and Missouri Botanical Garden (TROPICOS and Flora North America). Such programs desperately need more support in the next four years, for a small investment in compatibility now will save enormous amounts of time, money and opportunity later.

d. Greater emphasis must be given to database design, and to programs intended to assist in the development of compatible systems. All the great intentions in the world will be to no avail if technical assistance is not available to institutions that are preparing to establish or modify biological databases. If compatibility is the key to future communication, then training and assistance in how to use that key is an essential part of the overall program. As an example of how this can function, the Center for Plant Conservation installs initially compatible database systems - the BG-BASE application of Revelation software - in botanic gardens and other conservation applications. Each project involves on-site training and followup with staff as well as installation of the actual software.

e. The uses and users of biological databases should be carefully considered as national programs are being developed. It may seem a trivial observation that data should be collected and maintained only if it is useful or necessary. And yet, many databases are replete with never-used or unpopulated fields, or lack key types of information that could have been incorporated with careful planning. Similarly, the user communities for biological databases are an important constituency for support, and thus their data needs should be ascertained and incorporated whenever possible. For example, at the Center for Plant Conservation we will be building in fields of information into our databases on rare plants that may help identify research interest by corporations in forestry, agriculture, or pharmaceuticals. Such connections will be essential for the future of conservation.

f. Finally, all major data systems should be concerned as part of an international network. Biological diversity and distribution, threats, conservation, and resource use are global matters, and we must organize our data systems accordingly. More and more conservation work is inherently international, and so we need to always think on this scale. Again, a small investment in international compatibility now will pay dividends for years to come.

From a biodiversity conservation point of view, data systems and data sets are tools, extraordinarily powerful and important ones, without which conservation cannot be effectively carried out. But such systems should not be thought of as an end in itself, for the end must always be the actual preservation of living organisms and their habitats. As such we must not be lulled into thinking that our work is done once we have created a detailed list of species. Decrying "the extinction of species before they have been described by science" has always seemed a curious and backward way of measuring the tragedy of the loss of biological diversity.

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

June 29, 1988



OFFICE OF THE
ASSISTANT DIRECTOR
FOR BIOLOGICAL, BEHAVIORAL,
AND SOCIAL SCIENCES

Dr. David Blockstein
Subcommittee on Natural Resources,
Agriculture Research and Environment
Committee on Science, Space and Technology
House of Representatives
Washington, D.C. 20515

Dear Dr. Blockstein:

I am replying to Chairman Scheuer's invitation of April 26, 1988 to Erich Bloch, Director of the National Science Foundation (NSF), to comment on H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act. Congressional interest in biological diversity is certainly timely as we, as members of a global society, confront the finite limitations of our natural resources and the potential of multiple threats to them, including global climate change and chemical pollution of the environment. However, given the technical and logistical uncertainties related to H.R. 4335, enactment of this legislation would be premature. Moreover, the bill would be expensive and difficult to implement. It also could hamper current efforts to conserve biological diversity under other authority, such as the Endangered Species Act. For all these reasons, we oppose enactment of H.R. 4335.

I also would like to raise two additional matters in connection with this proposed legislation.

Establishing as a national policy the conservation of biological diversity is worthwhile, and many of the actions called for in this legislation focus on this end. The basis for most of the proposed actions derive appropriately from the study by the Office of Technology Assessment, Technologies to Maintain Biological Diversity.

The amount of legislation relating to biological diversity and its maintenance is impressive. Given the number of existing laws and the numbers of agencies involved, it is not surprising that without specific attention there are duplications of effort and other problems. Therefore, an interagency effort to review and coordinate the development of a national strategy for biological diversity is the important first step. This effort can be achieved under existing authority by, for example, the Federal Coordinating Council for Science, Engineering and Technology.

Dr. David Blockstein

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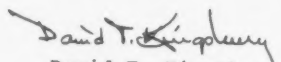
In that regard, we are curious as to the basis for the omission of NSF from the membership of the Interagency Working Committee proposed in H.R. 4335. While it is true that we are not a natural resource management agency, our role in support of research at colleges and universities is critical to development of any national strategy. In systematic biology, for example, the funds available through the NSF's Systematic Biology Program constitute 95% of the resources available to scientists at U.S. colleges and universities working in this essential scientific field. NSF takes its role in support of systematic biology seriously, as does the National Science Board. Last October, the NSB tasked the Committee on International Science to undertake a comprehensive study of biological diversity and to make recommendations concerning NSF as well as other needs.

Also, we believe that establishment of the proposed National Center for Biological Diversity and Environmental Research is premature in the absence of a national strategy and corresponding implementation plan. The plan proposed raises many questions and rests on the assumption that this one mechanism is the best way to proceed. We do not believe that this conclusion has had the benefit of comprehensive debate.

A more philosophical concern is that the proposed action implies that what now exists is fatally flawed and something new is needed. I do not think we want to rush to that conclusion. As I study the issue, I am impressed with what resource agencies can accomplish by way of restoration and preservation with modest expenditure of funds per unit of effort. I think the question should be raised as to what can be done with funding to existing bodies who by law have many functions similar to those proposed for the center.

Thank you for the opportunity to make these comments. Please do not hesitate to let us know if we can be of further assistance. The Office of Management and Budget has advised that there is no objection to the submission of this report from the standpoint of the Administration's program.

Sincerely,


David T. Kingsbury
Assistant Director



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltsville, Maryland
20705

June 1, 1988

Dr. David Blockstein
Subcommittee on Natural Resources
388 H.O.B. Annex II
Washington, D.C. 20515

Dear Dr. Blockstein:

In response to Mr. Scheuer's request for comments and recommendations relative to H.R. 4335, I wish to call attention to the omission of the Agricultural Research Service (ARS) of the USDA and the cooperating State Agricultural Experiment Stations as most involved participants. ARS coordinates numerous activities involved with the conservation of biodiversity through its individual research and support units. Some of the activities include:

Acquisition, preservation, evaluation and distribution of plant germplasm of economic crops and their relatives

Curation of industrially important microbial collections

Curation of entomophagous fungi for biocontrol

Systematics support for plants, insects, nematodes, and fungi

Support of other national projects through memoranda of understanding

Initiation of review of conservation of economic animal germplasm and related species

The activities of the National Plant Germplasm System (NPGS) for the acquisition, preservation, evaluation and distribution of plant germplasm are coordinated through the ARS National Program Staff at Beltsville, MD. Included are the Regional Plant Introduction Stations, National Clonal Germplasm Repositories, commodity collections, special genetic stock collections held at both Federal and State locations across the nation. The base collection of all plant seed material is held at the National Seed Storage Laboratory at Fort Collins, CO.

Industrially and agriculturally important microbial collections are maintained by ARS at several sites such as Peoria, IL (Northern Regional Research Center) and Beltsville, MD.

Entomophagous fungal collections are held by ARS at Fargo, ND and Ithaca, NY for use in biocontrol programs.

The ARS Systematics group at Beltsville has numerous taxonomists working at Beltsville, the Smithsonian Institute, and the National Arboretum and provide national and international support for various herbaria and research scientists.

Lastly, ARS provides support to various groups for germplasm conservation. Memorandums of Understanding are in effect with the Center for Plant Conservation at the Arnold Arboretum, Jamaica Plain, Massachusetts, for

Dr. David Blockstein

2

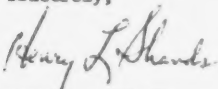
preservation and research on the rare and endangered species; Agricultural Marketing Service for preservation of varieties issued Plant Variety Protection Certificates; Crop Science Society of America for CSSA Registered varieties; and, with the Soil Conservation Service's Plant Materials Centers for preservation of plants used in soil conservation efforts throughout the country.

Efforts to focus upon conservation of important animal germplasm are underway. These efforts are much more complicated because of the international need to coordinate activities.

Because of the importance of agriculture and its vested interest in the conservation of important plant, microorganism and animal germplasm, the omission of its full participation in any biodiversity act seems a serious oversight.

Thank you for the opportunity to review the bill prior to its hearing.

Sincerely,



HENRY L. SHANDS
National Program Leader
Germplasm

cc w/cy inc.:
O. Bentley
M. Carter
E. Knippling



GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D.C. 20230

02 AUG 1988

Honorable James H. Scheuer
Chairman, Subcommittee on Natural Resources,
Agriculture Research and Environment
Committee on Science, Space, and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This is in response to your request for the views of the
Department of Commerce on H.R. 4335, a bill entitled the

"National Biological Diversity Conservation and Environmental
Research Act."

The Department of Commerce opposes enactment of H.R. 4335 because
the bill would be expensive and cumbersome to administer and
because its objectives are currently being pursued under other
authorities such as the Endangered Species Act.

H.R. 4335 would establish a national policy for the conservation
of biological diversity; amend the National Environmental Policy
Act of 1969 (NEPA) by adding a requirement for an impact assess-
ment on biological diversity; support research on biological
diversity; establish mechanisms for carrying out the national
policy and for coordinating related activities; and provide for
the collection, synthesis, and dissemination of information
necessary to meet the objectives of the policy.

H.R. 4335 would require the National Oceanic and Atmospheric
Administration (NOAA) to include an impact assessment on
biological diversity in every recommendation or report on its
legislative proposals and other major actions that significantly
affect the quality of the human environment and to comment on
such assessments by other agencies concerning areas in which NOAA
has special expertise. NOAA's National Marine Fisheries Service
would be required to participate as a member of the Governing
Board of the proposed National Center for Biological Diversity
and Environmental Research, as a member of the proposed
Interagency Working Committee on Biological Diversity, and,
potentially, as a member of the National Scientific Advisory
Committee on Biological Diversity. Additional requirements of
NOAA include: identification of biotic communities, species,
populations, and geographic areas that are of special concern;
review of existing data bases and information on biological
diversity (i.e., fisheries survey data); participation in field
surveys and other research directed specifically at biological

diversity questions; and, supplying data or information that is requested by the National Center.

The proposed legislation calls for the development of a Federal strategy for conservation of biological diversity. The strategy would address, among other things, interagency cooperation, ecosystem management, Federal grants, biosphere preserves and international actions of Federal agencies.

We fully support the ecological concept of diversity and support development of a national policy. This effort can be made under current authority. Moreover, we oppose an amendment of NEPA to require all Federal agencies to consider the impacts of their activities on biological diversity. Specifying that the scientifically vague term, "biological diversity", be included would open the door for unnecessary legal challenges to environmental impact statements. We find, furthermore, that the implementing mechanisms proposed in H.R. 4335 are cumbersome and appear to duplicate existing legislative authorities to conduct environmental assessments and research and to conserve species of concern. Under existing authorities, NOAA addresses ecosystem health, including habitat and forage species of those species we are charged with managing.

H.R. 4335 also appears to overlook several Federal agencies that have been involved in biological diversity, and have actually developed strategies for maintaining biological diversity. In 1981, the Departments of Agriculture, Commerce, Interior and State, the Council on Environmental Quality, the Smithsonian Institution, the National Science Foundation and the U.S. Man and the Biosphere Program sponsored a Conference on Biological Diversity. In response to recommendations coming out of that conference, Congress amended the Foreign Assistance Act to establish the conservation of biological diversity and endangered species as a component of U.S. foreign assistance programs. Accordingly, the Agency for International Development (AID) established an Interagency Task Force on Biological Diversity, which developed a comprehensive international biological diversity conservation strategy with specific recommendations for action. AID has been involved in an increasing number of biological diversity projects including research on biological diversity as it relates to specific development concerns and training to create environmental learning centers. A second conference on biological diversity was convened by the National Academy of Sciences in 1986. The Departments of Agriculture and State, the National Science Foundation and the National Academy of Sciences are key players in this field.

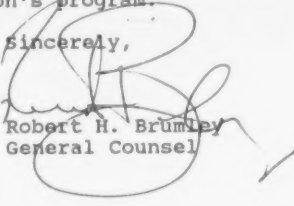
We also believe that further consideration of the scientific feasibility of several aspects of the legislation seems warranted. Specific questions include: what is an acceptable level of diversity; what criteria and methodology will be used to

determine when that level of diversity exists; and, what priority will be given to research on biological diversity relative to work currently being done by the agencies involved?

Given the many scientific and logistical uncertainties involved in the proposed endeavors, we think it is premature to establish a center and convene advisory and working committees. We think that legislation like H.R. 4335 should not be considered until the many unanswered questions regarding the technical approach to be used in measuring and assessing species diversity can be resolved.

The Office of Management and Budget advises that there is no objection to the submission of this report to the Congress from the standpoint of the Administration's program.

Sincerely,



Robert H. Brumley
General Counsel

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE WASHINGTON, D. C. 20418

OFFICE OF THE PRESIDENT

May 17, 1988

Hon. James H. Scheuer, Chairman
Committee on Science Space and Technology
Subcommittee on Natural Resources,
Agriculture Research and Environment
Suite 2321 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Scheuer:

Thank you for the opportunity to comment on H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act.

I am pleased to learn that this bill, which makes the conservation of biological diversity a national goal and priority, has been introduced. As I am sure you know, the National Academy of Sciences, through the National Research Council, has long standing concern with this issue. Over the years the NRC has issued several reports on aspects of biological diversity, with particular attention to genetic diversity in crop plants and to the preservation of diversity in the humid tropics (Attachment I). BIODIVERSITY, a book of papers presented at our September 1986 National Forum on Biodiversity has just been published.

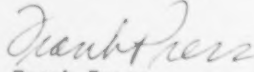
While H.R. 4335 focuses on biodiversity in the United States, it is gratifying to note that it includes attention to the preservation of biodiversity globally. Among the greatest threats to biodiversity are those to be found in developing countries, and the negative consequences of large scale deforestation, desertification and other processes leading to loss of biodiversity are quite likely to be global in scope.

The purposes of the legislation as stated in Section 4 are praiseworthy. The provisions for implementation, however, are somewhat complex, calling for the establishment of a National Center for Biological Diversity and Environmental Research, an Interagency Working Committee on Biological Diversity, a National Scientific Advisory Committee on Biological Diversity, and the development of a Federal Biological Diversity Strategy. In addition, it is proposed that the Council on Environmental Quality will become involved in consideration of biological diversity in the environmental impact assessment process.

Hon. James H. Scheuer
May 17, 1988
Page 2

As to the feasibility of the mechanisms proposed for the implementation of H.R. 4335, I defer to Congress and the Executive Branch. Nor can I comment on the proposed role of the National Academy of Sciences outside the context of the proposed procedural and administrative mechanisms. I can, however, assure you of the Academy's strong interest in the subject of this legislation. Our resources in this area are considerable. We have recently established a Program in Biodiversity within the National Research Council's Board on Basic Biology. The Program has a distinguished Advisory Committee (Attachment 2) which has, I am told, already provided commentary on early drafts of H.R. 4335. Staff Director for the Program in Biodiversity is Dr. Walter G. Rosen, who will, I am sure, be happy to provide you with information and assistance as plans proceed for hearings on the bill. Dr. Rosen can be reached at 334-2483.

Yours sincerely,



Frank Press
President

Attachments

Publications of the National Academy of Sciences/National Research Council

BioDiversity, E. O. Wilson, ed. 1988.

Agricultural Biotechnologies: Strategies for National Competitiveness. 1987.

Introduction of Recombinant DNA-Engineered Organisms into the Environment: Key Issues. 1987.

Population Growth and Economic Development: Policy Questions. 1986.

Ecological Knowledge and Environmental Problem-Solving: Concepts and Case Studies. 1985.

Opportunities in Marine Sciences and Technology for Developing Countries. 1985.

Ecological Aspects of Development in the Humid Tropics. 1982.

Testing for Effects of Chemicals on Ecosystems. 1981.

Research Priorities in Tropical Biology. 1980.

Conversion of Tropical Moist Forests. 1980.

Conservation of Germplasm Resources, An Imperative. 1978.

Productivity of World Ecosystems. 1975.

December 1, 1987

COMMISSION ON LIFE SCIENCES
Board on Basic Biology

Committee on Biodiversity

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Illinois Natural History Survey

A Division of the Department of Energy and Natural Resources



172 Natural Resources Building 607 East Peabody Drive, Champaign, Illinois 61820, (217) 333-6880, FAX (217) 333-4949

June 28, 1988

The Honorable James H. Scheuer
Committee on Science, Space, and Technology
U. S. House of Representatives
Suite 2321 Rayburn House Office Building
Washington, D.C. 20515

Dear Congressman Scheuer:

From 21 through 24 September 1986, a group of about sixty distinguished scholars and scientists from around the world addressed capacity audiences at the National Forum on BioDiversity, held under the auspices of the National Academy of Sciences and the Smithsonian Institution. All Forum participants stressed the need to maintain biodiversity, and a consensus soon emerged that the greatest threat to this goal today is from human activities.

Biological diversity is a resource which must be measured, utilized, and preserved. The National Biological Diversity Conservation and Research Act, recently introduced as H.R. 4335, represents a major national commitment toward those ends. It provides for the collection and dissemination of information on biological diversity, supports basic research, requires specific assessment of impacts upon biological diversity, establishes mechanisms for coordination of activities at all levels, and provides for education of citizens regarding the importance of biological diversity. Such action has long been sought by the scientific community. I endorse H.R. 4335 fully and urge your Committee or the Subcommittee to work toward its implementation.

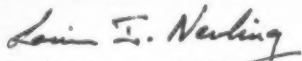
The Illinois Natural History Survey, where I am Chief, represents at the state level what H.R. 4335 proposes for the nation. As a measure of the importance of this activity to the State of Illinois, note that our annual funding exceeds that proposed for the national program in its first year. One interesting application of a fairly complete biological survey is its utility in recognizing recent invaders from other areas. In Illinois, we have used this capability to locate and contain outbreaks of the gypsy moth, to identify and control a beetle pest of our horseradish crop, and most recently, to monitor the spread of important vectors of diseases of man: the Asian tiger mosquito, which carries 26 viral diseases, including several forms of encephalitis especially dangerous to youngsters; and the deer tick, which carries Lyme disease, perhaps America's number two epidemic, second only to AIDS.

The Honorable James H. Scheuer
Committee on Science, Space, and Technology

2

The Illinois Natural History Survey was the first state survey, founded 130 years ago, and with a staff of 230 is the largest of the dozen or so similar organizations in other states. In recent years, we have served as a model for states implementing (Kansas) or planning (Alabama) biological surveys. Our accomplishments in creating a biological database within a state-of-the-art geographic information system are second to none. Agencies from throughout the world have come to benefit from our experiences in this area at the forefront of data-management technology. I submit that similar transfers of technology would be helpful in nurturing a fledgling national program and offer both my services and those of my staff.

Sincerely,



Dr. Lorin I. Nevling
Chief

LIN:aa



Wildlife Management Institute

Suite 725, 1101 14th Street, N.W., Washington, D.C. 20005 • 202/371-1808

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Board Chairman

June 1, 1988

Honorable James H. Scheuer, Chairman
Subcommittee on Natural Resources,
Agriculture Research and Environment
U.S. House of Representatives
Washington, D.C. 20515

Dear Chairman Scheuer:

Thank you for the opportunity to express our views on H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act.

Conservation of biological diversity is not a new concept in natural resource management. Before the turn of the century, this country's biological diversity was in a precarious state of decline. Clearing forests, plowing prairies and overgrazing rangelands seemed to be the new manifest destiny of a rapidly expanding 19th century America. Wholesale exploitation and development brought numerous species, such as the passenger pigeon and bison, to or near the brink of extinction. Many others, such as the pronghorn antelope, wild turkey and white-tailed deer, were at record population lows.

The government's response during this period of declining biological diversity was to create a new federal agency, the Bureau of Biological Survey. Its primary charge was to conduct field surveys documenting the geographic distribution of native plants, birds and mammals. Eventually, the Bureau of Biological Survey evolved into the present day Fish and Wildlife Service as its powers and responsibilities were broadened to include the preservation, restoration and enhancement of biological resources.

H.R. 4335 reminds us today that conserving biological diversity has been and will continue to be an ongoing challenge. Human population growth, urban sprawl, industrial development and intensive land/water uses have placed unparalleled pressures on biotic systems. Establishment of a national goal for conserving biological diversity, as called for by H.R. 4335, emphasizes the ecological and economic importance of maintaining landscape diversity and also should strengthen public understanding and support for conservation.

A number of government agencies are responsible for conserving biological diversity under existing federal laws or mandates. However, overlapping and duplicative efforts, jurisdictional restrictions, and conflicting priorities can sometimes impede overall program efficiency. For instance, wetland monitoring efforts are conducted by least three government agencies (Fish and

Wildlife Service, Department of Agriculture, Environmental Protection Agency), many state governments (e.g., Massachusetts, New York, etc.) and several private nonprofit organizations (e.g., Ducks Unlimited). Definitions and classification systems for assessing wetland communities vary among the organizations. A comprehensive approach focusing on conserving biological diversity could improve coordination and enhance efficiency and effectiveness of Federal, State, and private programs without interfering with the achievement of individual program objectives.

The Institute supports the establishment of a National Center For Biological Diversity and Environmental Research to serve as a clearinghouse for biotic information and as a communication network to link existing and developing biotic data bases. Such a Center could also identify informational gaps and provide recommendations for conducting supplementary research, as appropriate. The focus of the National Center must be on developing biotic information that is relevant and applicable to use locally in completing natural resource management plans and decisions, as well as nationally to establish helpful policies.

To facilitate full support of the National Center and to provide additional input for the successful coordination of national biotic data bases, the Institute recommends strongly that representatives from the U.S. Geological Survey, Environmental Protection Agency and from a state fish and wildlife agency be added to the Center's governing board.

The Institute also supports the establishment of an Interagency Committee to develop a coordinated federal strategy for conserving biological diversity. Such a strategy must emphasize the development of integrated natural resource management objectives within agencies and consistency among federal programs and activities. It also should give priority consideration to existing federal commitments and strategies that will enhance biological diversity such as the North American Waterfowl Management Plan.

The Institute further recommends that the Soil Conservation Service (SCS) be added to the Federal Interagency Committee for conserving biological diversity. Federal agricultural policies and programs affect more than 350 million acres of croplands and have a profound impact on biological communities across the nation. Much of the current decline in biological diversity can be traced directly to agricultural land use practices. It is the Institute's opinion that without agency commitment from the SCS, conservation of biological diversity has little chance for success in large areas of the U.S. A conservation dimension must be integrated in all agricultural commodity programs to help meet national conservation goals and objectives.

H.R. 4335 seeks to establish federal agency partnerships with state and private organizations through a cost-share grant program. Matching monies would be used to fund cooperative projects to maintain or restore biological diversity through research, resource management, personnel training, public education or other means. The Institute strongly suggests that additional funding be provided to augment existing agency cost-share programs, rather than earmarking current appropriations for conservation of biological diversity.

The Institute appreciates this opportunity to provide this statement on H.R. 4335 and requests that it be included in the official record.

Sincerely,

A handwritten signature in dark ink, appearing to read "L. R. Jahn", written in a cursive style.

Laurence R. Jahn
President

LRJ:dt



THE WILDLIFE SOCIETY

5410 Grosvenor Lane • Bethesda, MD 20814 • Tel. (301) 897-9770

June 22, 1988

The Honorable James H. Scheuer, Chairman
Subcommittee on Natural Resources,
Agriculture Research and Environment
H2-388 House Office Building Annex II
Washington, DC 20515

Dear Chairman Scheuer:

The Wildlife Society appreciates the opportunity to present our comments and recommendations regarding H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act. The Wildlife Society is an international association of professional wildlife managers working in the public and private sectors to promote wise stewardship of our natural resources.

The Wildlife Society strongly supports the Act's goal of establishing a national policy for the conservation of biological diversity. With reductions in biological diversity occurring at an alarming rate world-wide, the development of a national policy dealing with this issue is both timely and appropriate. However, while perpetuating and/or protecting biological diversity is of major importance, habitat management and manipulation activities also will be necessary for the maintenance or enhancement of biological diversity, and must be provided for during the development of a national biological diversity strategy.

The Society supports the inclusion of Section 5 (d) of H.R. 4335, amending the National Environmental Policy Act of 1969 (NEPA) to require environmental impact statements to assess any impacts on biological diversity, in addition to the assessments already required by NEPA.

We oppose the establishment of a National Center for Biological Diversity and Environmental Research (Section 6). We feel that the proposed functions of the Center could best be accomplished through the actions of the President's Council on Environmental Quality and by the Interagency Working Committee on Biological Diversity. Additionally, we recommend that the authorization of appropriations (Sec. 11) pertaining to the Research Center be deleted.

We do, however, support the establishment of an Interagency Working Committee on Biological Diversity with representatives from the Bureau of Land Management, the National Park Service, the Fish and Wildlife Service, the Forest Service, the Department

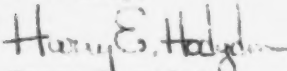
of Defense, the Environmental Protection Agency, the National Marine Fisheries Service and the Council on Environmental Quality. While we believe that the function of preparing and coordinating Federal activities for the conservation of biological diversity could be well served by this Committee, the Committee should not be responsible for implementing the Federal strategy for conservation of biological diversity (Sec. 8). Instead, each individual member agency should be responsible for implementing the strategy in a manner consistent with its legal mandates, missions, and other relevant considerations.

The Society also supports the National Scientific Advisory Committee on Biological Diversity as established by Section 10 of H.R. 4335.

Additionally, the Society recommends that a greater emphasis be placed on cooperative efforts among land management agencies, individuals, and private non-profit organizations as a means of conserving biological diversity. The provision for matching funds contained in Section 9 should permit matching in cash or in kind, and should require that States be included in the matching requirements.

Please include this testimony in the official record of the June 9 and 30, 1988 hearings on H.R. 4335. Thank you.

Sincerely,



Harry E. Hodgdon
Executive Director



THE OCEANIC SOCIETY

EDUCATION • RESEARCH • CONSERVATION

EXECUTIVE OFFICES
1536 16th Street, N.W.
Washington, D.C. 20036
(202) 328-0098

July 20, 1988

Honorable James H. Scheuer
Subcommittee on Natural Resources,
Agriculture Research and Environment
Committee on Science Space and Technology
U.S. House of Representatives
Washington, D.C. 20515

Dear Chairman Scheuer:

I am writing on behalf of the Oceanic Society to commend your efforts toward establishing a national policy for the conservation of biological diversity and to support the purposes of H.R. 4335. We would, however, suggest amendments which would better ensure that marine biological diversity be given an appropriate share of attention in the matters of policy, research, education and information addressed under this bill.

Marine environments, while not excluded from the bill, were benignly neglected as if they did not exist during the two hearings convened by your Subcommittee on Natural Resources, Agriculture Research and Environment last month. That omission has given us reason to be concerned that oceans and estuaries may get short shrift when it comes to implementing programs under H.R. 4335. Yet 70% of the earth's surface is ocean; more phyla (the highest level taxonomic division representing the greatest genetic variation between groups) are found in marine than in terrestrial environments; and, while estimates of the relative number of marine species vary, many experts believe they represent a majority of species on earth.

Nor should we conclude that biological diversity in marine systems is not threatened as it is on land. Testimonies presented this year at several hearings in the House and Senate document well the degradation of marine systems, including environmental crises in coastal waters around the world. Officials from Federal agencies, representatives of state organizations, scientists, and environmental organizations (including the Oceanic Society) have all agreed on the severity of the problem. Since declining species diversity goes hand in hand with environmental degradation, it is clear that biological diversity is indeed threatened in marine systems.

THE OCEANIC SOCIETY IS A NON-PROFIT 501 (C) (3) ORGANIZATION
CONTRIBUTIONS ARE TAX DEDUCTIBLE

To guarantee that marine ecosystems be given appropriate consideration and protection with respect to their inherent biological diversity, we would like to recommend the following amendments to H.R. 4335:

(1) Section 6(c)(2) prescribes the membership of the governing board of the proposed National Center for Biological Diversity and Environmental Research. Within that section, subsection (vi) specifies two scientists from nonprofit research institutions. We would like to see added the requirement that one of these be a marine scientist.

(2) Section 7(b) prescribes the membership of the Interagency Working Committee on Biological Diversity. The only marine representative on that committee is to be the National Marine Fisheries Service. We think it would be desirable to include a representative the National Ocean Service as well, since that branch of the National Oceanic and Atmospheric Administration is concerned with aspects of the marine environment in addition to fisheries. We also believe that it would be appropriate for the National Science Foundation to be represented on this committee because of the major role of research under this bill, and because NSF is demonstrably cognizant of marine science issues.

(3) Section 10(b)(1)(A) prescribes the membership of the Scientific Advisory Committee. Among the fifteen members are to be twelve scientists from nonprofit research institutions, nongovernmental organizations and natural resource industries (subsection (iv)). We recommend that a minimum of three of these be specified as marine scientists.

Although the bill as written does not prevent the above conditions being satisfied, we believe it is necessary to write in those conditions in order to guarantee that marine biological diversity is not inadvertently ignored as it was at your hearings.

It is our understanding that H.R. 4335 also has been referred to the Subcommittee on Fisheries and Wildlife Conservation and the Environment of the Committee on Merchant Marine and Fisheries. Given that subcommittee's significant interest in the marine environment, we look forward to working with them as well as your committee in trying to ensure adequate consideration of the oceans in the legislation. Over the next few months the Oceanic Society will be developing a base of information on marine biological diversity as part of a special project we are doing. Consequently, by the time this bill is considered by the Committee on Merchant Marine and Fisheries, we anticipate that we will want to submit more extensive comments.

- 3 -

In addition to our concerns about marine biological diversity, we would like to support the recommendation put forth by the Defenders of Wildlife, The Wilderness Society and the National Audubon Society that better provisions for enforcement be written into the bill. We look forward to working with you in trying to move effective legislation on conservation of biological diversity through the Congress.

Sincerely,

Boyce Thorne Miller
Boyce Thorne Miller
Staff Scientist

cc: Will Stelle



American Association of Zoological Parks and Aquariums

EXECUTIVE OFFICE AT OGLEBAY PARK, WHEELING, WV 26003 · 1998 (304) 242-2180

July 19, 1988

The Honorable James H. Scheuer
Chairman
Subcommittee on Natural Resources, Agriculture
Research and the Environment
Rouse Annex #2, Room 388
Washington, D.C. 20515

Dear Chairman Scheuer:

The American Association of Zoological Parks and Aquariums (AAZPA) submits these comments on H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act of 1988. AAZPA is the largest professional zoological park and aquarium organization in the world representing virtually every major zoological park, aquarium, wildlife park and oceanarium on the North American continent. Collectively zoos and aquariums in this country annually host more than 100,000,000 visitors.

The biological diversity of the earth is being degraded at an unprecedented rate. Broad based conservation efforts must be implemented to prevent as much of this loss as possible. The mission of the AAZPA Conservation Program is to contribute to the conservation of biological diversity through captive propagation and educational programs of zoos and aquariums and related activities, and to provide scientific and technical assistance for the intensive management of endangered species.

AAZPA is very supportive of your efforts to implement legislation to maintain the diversity of life through planning and prevention based on the best scientific information and understanding available. We commend you and the Committee for taking the leadership role in the concern about loss of biological diversity.

In our opinion, there is a major policy question unanswered by H.R. 4335. That is the question of what is a sustainable loss? Is the intent of Congress to protect all living things? Should the bill be addressing ecosystem processes and the potential to evolve new ecosystems? What criteria and methodology will be used to determine when too much biological diversity has been lost? We believe these questions need to be resolved, otherwise there is too much uncertainty created and the result could be considerable disappointment when expectations are not met. There must be guidelines for what constitutes an adverse impact on biological diversity.

AAZPA recommends that the Committee consider an aggressive approach such as requiring a project petitioner to demonstrate that the

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Oklahoma City Zoological Park

A nonprofit, tax-exempt organization dedicated to the advancement of zoological parks and aquariums for conservation, education, scientific studies and recreation.

proposed project would not decrease the sustainability of the impacted ecosystem and that biological diversity would not be lost. This would both stimulate interest in biological diversity and should generate useful information on biological resources as well.

The following are comments on specific sections of the bill.

Section 3. DEFINITIONS

The definitions are broad and because of that we are concerned that they may be unenforceable.

Section 4. PURPOSES

We urge the inclusion of an additional purpose: to support the coordination of both in situ and ex situ conservation efforts. We believe there needs to be a statement about the linkage of these efforts as part of the conservation of global biological diversity. Management of captive species is an integral part of conservation strategy; it relates directly to the protection of both habitat and species.

Section 5. POLICY

The conservation of biological diversity should be a national goal and a national priority. We believe that 5(c) is key; Federal agency actions must be consistent with the goal of conservation of biological diversity. We strongly encourage the Committee to consider a global approach towards biological diversity as well, ensuring that Federal agency actions in foreign countries must be consistent with the goal of conservation of biological diversity. Much of the earth's biodiversity occurs outside the United States. However, loss of this diversity will have a direct and drastic impact on this nation and its citizens. As a consequence, the United States should assume leadership and responsibility for preservation of biodiversity worldwide.

Section 6. NATIONAL CENTER FOR BIOLOGICAL DIVERSITY AND ENVIRONMENTAL RESEARCH

There is presently no national inventory available for information pertaining to biological diversity. We believe there is a need for a Clearinghouse of information and a uniform base of data which is organized and monitored to allow evaluation of the rate of loss of biological diversity. We believe that these data needs to be separate from the regulatory process.

We are uncertain, however, about the creation of another Federal entity. Could a revitalized Center for Environmental Quality be assigned some of the functions intended for the National Center? Or could the CEQ take the place of the proposed Interagency Working Committee on Biological Diversity?

One of the functions of the Center is to oversee a review of existing information on biological diversity, including data bases. There is in existence a computer based information system for wild animal species in captivity; the International Species Inventory

System. Basic biological information such as age, sex, parentage, place of birth, and circumstances of death, is collected and used for many different types of status reports relative to captive populations. There is no comparable uniform system used for museum collections and this is a clear need.

There are fair sized data bases organized for conservation purposes such as the Conservation Monitoring Center in Cambridge, England and the Nature Conservancy's State System. It may be a more efficient strategy to expand these present systems than to try to build a system de novo. At a minimum, we encourage interaction with the already existing system.

Section 7. INTERAGENCY WORKING COMMITTEE ON BIOLOGICAL DIVERSITY

We recommend that the membership of the Interagency Committee include a representative from the Army Corps of Engineers, State Department, Agency for International Development, World Bank and the African Development Bank. We believe that the addition of the international representatives will help broaden the focus from one of domestic biological diversity into a global perspective of biological diversity.

Section 8. FEDERAL BIOLOGICAL DIVERSITY STRATEGY

We believe that the most important part of the bill is the development of a coordinated Federal strategy for the conservation of biological diversity. We urge that the strategy submitted as a report to Congress include a schedule for implementation of the recommendations.

Section 9. GRANTS

The grant program is an admirable idea but there is too little money to have a significant impact.

Section 10. NATIONAL SCIENTIFIC ADVISORY COMMITTEE ON BIOLOGICAL DIVERSITY

The membership of the Advisory Committee will consist of twelve scientists who are not employed by the United States, from nonprofit research institutions, nongovernmental organizations and natural resource industries. We urge that language be added that one of those scientists be from a zoological institution with experience in linking in situ and ex situ conservation approaches.

The functions of the Scientific Advisory Committee include providing scientific and technical advice and counsel to the Interagency Committee in the preparation of the strategy to ensure that the best possible scientific information is used in developing the strategy. We believe that this language is too weak. If the Interagency Committee decides not to take the advice and counsel of the Scientific Advisory Committee, we believe it should have to state the reasons for non-acceptance or rejection. The Scientific

Advisory Committee will be comprised of experts in their field and we believe their advice should be adhered to except under special circumstances. We view the task of the Scientific Advisory Council to be that of establishing the strategy and the task of the Interagency Working Committee to be that of implementing that policy within the governmental framework.

We urge the Subcommittee to develop language addressing the interaction between the Center, the Interagency Working Committee and the Scientific Advisory Committee. The bill does not outline any line authority and, therefore, we are unsure as to which Committee is the final decision maker. We believe that this must be fully delineated by the bill.

Section 11. AUTHORIZATION OF APPROPRIATIONS

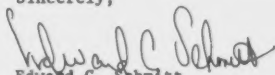
We urge the Committee to increase the request for appropriations. The present bill requests 5 million. We believe this request is not adequate. Conservation of biological diversity impacts each and everyone of us on a daily basis. It should be a national priority and treated as such.

One of the purposes of the bill is "to educate the citizens of the U.S. regarding the importance of biological diversity and foster actions that prevent biological impoverishment and preserve biological diversity and natural resources". Yet, there is no funding for public education in the bill.

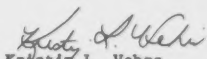
We note that the Defenders of Wildlife recommended a funding level of \$50 to 100 million, for the portion of the highway trust fund attributable to taxes on gasoline not used on highways. We support that recommendation.

In summary, AAZPA urges the Committee to consider our suggested changes and pass H.R. 4335. There is an urgent need for a cohesive national effort on conservation of biological diversity. It can be too late to save a species by the time it is identified as threatened or endangered under the Endangered Species Act. This is especially true of island flora and fauna such as those of the Hawaiian Islands. Although the U.S. represents only a small portion of the global problem, the U.S. is still looked upon as an environmental conservation leader. The U.S. needs to take its responsibility much more seriously and lead in the effort to conserve biological diversity.

Sincerely,



Edward C. Schmitt
Chairman
Legislation Committee



Kristin L. Vehrs
AAZPA/Legislative Representative



The Humane Society of the United States
2100 L Street, NW
Washington, DC 20037
(202) 452-1100

July 6, 1988

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Congressman James H. Scheuer
2466 Rayburn House Office Building
Washington, DC 20515-3208

Dear Congressman Scheuer:

Thank you very much for your recent letter to Mr. John A. Hoyt, president of the The Humane Society of the United States (HSUS). On behalf of The HSUS, and our more than 820,000 members and constituents nationwide, I would like to thank you for introducing HR 4335, the National Biological Diversity Conservation and Environmental Research Act. The HSUS is committed to protecting and restoring endangered species, and we support this legislation.

The current pace of destruction of the world's tropical forests is threatening entire ecosystems with extinction, with potentially tragic consequences for the whole globe. At the present rate of forest destruction and degradation, by the turn of the century all of the earth's lowland tropical rainforests, our richest treasure houses of animals and plants, will be gone.

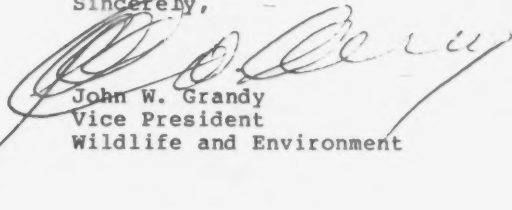
Hopefully, your efforts on behalf of the world's biodiversity will help prevent this disaster. We particularly support the section of the bill that amends the National Environmental Policy Act (NEPA) to require explicit consideration of biological diversity in Environmental Impact Statements. We suggest that overseas activities of government agencies (i.e. the Agency for International Development and the National Institutes of Health), companies funded by the

Congressman Scheuer
 July 6, 1988
 Page Two

federal government, and multilateral development banks with U.S funding, all be required to prepare Environmental Impact Statements on their activities, and address biodiversity implications.

Thank you again for your efforts on behalf of the earth's biodiversity. This is not an isolated problem, but rather perhaps the issue of overriding concern for our planet's future.

Sincerely,



John W. Grandy
 Vice President
 Wildlife and Environment



**American
Pharmaceutical
Association**

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Washington, DC 20037
(202) 628-4410 FAX (202) 783-2351

*The National Professional
Society of Pharmacists*

APhA

John F. Schlegel, PharmD
President and CEO

Charles R. Green
Chairman of the Board

May 31, 1988

The Honorable James H. Scheuer
Chairman, Subcommittee on Natural Resources
Committee on Science, Space and Technology
388 H.O.B. Annex II
United States House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

The American Pharmaceutical Association (APhA) is pleased to submit comments on HR 4335, the National Biological Diversity Conservation and Environmental Research Act. APhA is the national professional association representing pharmacists throughout the United States. APhA also represents a significant number of research scientists in the fields of study associated with pharmaceutical science. One of these disciplines, pharmacognosy, specifically relates to medicinal agents derived from plants or animals. The loss of plants and animals which are the source of potential new drugs is a very serious concern to these scientists, as well as to the other members of APhA.

APhA recognizes that there are many plant and animal species which are possible sources of new and important medications. It is alarming to consider that years ago there might have existed a plant or microorganism that produced a chemical that could have cured AIDS or other diseases, but that through inaction, that species became extinct. APhA therefore supports the goals and objectives of HR 4335 and commends you and the other sponsors for your important efforts.

Because the various disciplines within pharmacy and the pharmaceutical sciences are intimately involved with the discovery and development of medicinal agents, many of which are derived from plant and animal species, we believe pharmacy should be represented on the various bodies which would be established by this legislation.

Experts in the area of pharmacognosy are involved with research that categorizes newly discovered plant and animal species and these experts should be specifically included on the various boards and committees established by this bill. The National Institutes of Health (NIH) is the major federal agency involved with research in all

Chairman, The Honorable James H. Scheuer
May 31, 1988
Page 2

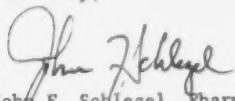
areas of health care. A representative from NIH could bring the perspective of health care researchers to the governing board. Associations that represent the pharmaceutical sciences and, in particular the science of pharmacognosy and ethnopharmacognosy, should be consulted in naming the rest of the members of the board.

The following are specific suggestions for amending the bill to ensure that it addresses our concerns about appropriately recognizing the role of pharmaceutical scientists:

- (1) The discipline of pharmacognosy should be added to the list of research areas [page six, section 4 (5)].
- (2) A representative of the National Institutes of Health should be included along with those from the Smithsonian Institution, the Fish and Wildlife Services, and the National Marine Fisheries Service on the Governing Board of the National Center for Biological Diversity and Environmental Research [page 10, section 6 (c)(2), line 25].
- (3) The National Academy of Sciences should be required by this legislation to obtain recommendations for nominees to the Center's Governing Board from the American Pharmaceutical Association [page 10, section 6 (c)(2)].
- (4) The Interagency Working Committee on Biological Diversity should include a representative from the National Institutes of Health [page 13, section 7 (b)].
- (5) The National Scientific Advisory Committee on Biological Diversity should include at least one member approved directly by APhA [page 18, section 10 (b)].

APhA believes that the bill will be strengthened and better achieve its goals if it ensures that the scientists involved with the development of medicinal agents from endangered plants and animals have a strong voice in the national effort to ensure their survival. APhA stands ready to work with the subcommittee to ensure that the views of pharmaceutical scientists are represented.

Sincerely,



John F. Schlegel, Pharm.D.
President

JFS/efg

The University of Michigan
School of Natural Resources

Samuel Trask Dana Building
 Ann Arbor, Michigan 48109-1115

WILDLAND MANAGEMENT CENTER

SUMMER ADDRESS:

Society for Conservation Biology
 RM1BL
 P. O. Box 519
 Crested Butte, CO 81224

July 1, 1988

Representative James Scheuer
 U.S. Congress
 House Natural Resources Subcom.
 308 H.O.B.
 Washington, D.C. 20515

Dear Congressman Scheuer,

I apologize for the printer. We don't have the most advanced facilities at this field station at 9600' in the Rockies.

I could not testify in person again before your Subcommittee on the matter of H.R. 4335 on June 30. Nevertheless, I want to make my reaction known to you because I think that it represents the impression of many conservation biologists.

First, the twin crises that threaten the diversity of life on this planet -- destruction of habitats, especially forests, and large-scale anthropogenic disturbances to the atmosphere -- are of the utmost importance. Although the problems are manifold, global, and complexly interconnected, we must come to grips with them, and you and your fellow sponsors are to be congratulated for having recognized this early on. I know I speak for many others in encouraging you to sustain your efforts and leadership.

The bill has been attacked for its emphasis on a national biological inventory or survey. This is unfortunate, because systematics is a major footing for the protection of biodiversity, and systematics in this country is grossly undersupported.

On the other hand, it is important that the emphasis in this bill on support for systematic biology not be viewed as providing the total solution. For example, the Society believes that the National Science Foundation should increase its support for basic research in conservation biology, and that Congress should authorize additional appropriations for this purpose. Without balanced support for these other aspects of conservation biology, many of which are mentioned in HR 4335, the promise that conservation biology can provide the management guidelines necessary for conservation and sustainable development will be unmet.

I believe that there are several aspects of the bill that could be improved. I comment on these herein. In the addendum to this letter I attach some suggested changes in the wording of the bill.

The bill addresses the need for a *Federal Biological Diversity Strategy*. It is important to distinguish this from a *National Biological Diversity Strategy*. In the current draft, the former is to be written by the Interagency Committee. This means that it will be the product of federal agencies, some of which have questionable histories regarding their support for biological diversity, or are too closely tied to the industries that they are supposed to regulate. For example, I wonder if the Forest Service or the BLM are currently able to support an increased emphasis

Representative James Scheuer/Page 2

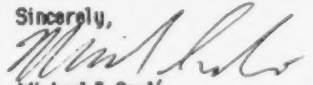
on conservation, and a lower priority on logging and grazing.

We need a **National Strategy** that represents a much broader constituency than the federal agencies. Who, then, should be responsible for producing the **National Strategy**? Probably it should be a special commission of some kind, with members chosen from university scientists, NGO's, etc. The Center could also be charged with doing the Strategy. One aspect of such a **National Strategy** would be suggestions about the international role and responsibilities of the Federal Government, particularly of agencies like A.I.D., the Peace Corps, the U.S.F.W.S. It might even recommend an "International Conservation and Sustainable Development Corps."

The bill also proposes the formation of a **National Scientific Advisory Committee on Biological Diversity**. This body, as currently conceived, will have little if any clout, in part because it has no staff and no budget. Perhaps this group should be advisory to the Board of the Center. Perhaps it should draft the **National Strategy**.

I realize that you must be receiving diverse and conflicting testimony, and that this might be discouraging. I suppose this goes with the territory. In any case, the Society for Conservation Biology stands ready to assist you and your staff in redrafting the bill, or in any way it can.

Sincerely,



Michael E. Soule,
President,
Society for Conservation Biology

cc: Representative Claudine Schneider

ADDENDUM TO LETTER FROM DR. SOULÉ

Suggested changes in wording of HR 4335 IH:

- Page 3, ln 17: delete "rather than focusing on maintaining " and insert "but lack the implementation mechanisms to protect the critical habitat" [This change avoids the implied, baseless criticism of species programs, which in themselves are very important.]
- Page 5, ln 10: add at end "including the viability of populations throughout their natural geographic distributions"
- Page 5, ln 19: add at end "or a particular place in the world"
- Page 5, ln 22: the following first clause should be inserted: "(1) to conserve the biological diversity of the United States, and to facilitate international conservation efforts;"
- Page 5, ln 23: after "diversity" insert ",including the effects on ecosystem and population viability,"
- Page 6, ln 10 Rewrite clause (5) as follows:
 "(5) to enhance the support for research in conservation biology necessary for the conservation of biological diversity; and" [This change mitigates the problem of leaving out various groups and disciplines, since conservation biology is an umbrella term that includes all relevant fields, including those in the social sciences.]
- Page 8, ln 4 delete "ENVIRONMENTAL" and insert "CONSERVATION"
 ["Environmental" is too broad a term in this context; it includes such issues as air pollution, noise pollution, toxic wastes, and other issues that might detract from the primary focus on biological diversity. I think this change is important, even though it may be symbolic.]
- Page 8, ln 6 same as above
- Page 8, ln 21 delete "biota" and insert "status of biological diversity"
- Page 8, ln 24 after "taxonomic groups" insert "ecological communities"
- Page 9, ln 2 after "Nation" insert "and the conservation of this biological diversity for the benefit of the Nation"
- Page 15, ln 9 insert at end "and the long-term viability of such systems and species"
- Page 18, ln 19 after "from" insert "universities"



AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

RESOLUTION
SUPPORTING LEGISLATION
ON NATIONAL BIOLOGICAL DIVERSITY CONSERVATION AND RESEARCH

Whereas biological diversity is indispensable to the functioning of ecosystems, provides raw materials, products, and ideas for human civilization, and provides esthetic pleasure, emotional well-being, and spiritual enlightenment;

Whereas the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate is certain to increase greatly over the next several decades;

Whereas the deterioration of the biological diversity of the planet is a significant concern of scientists, and a serious problem for humanity;

Whereas, the United States is being asked to take a leadership role internationally, but does not have a Federal policy toward conservation of biological diversity;

Whereas, scientific understanding of the components of biological diversity is inadequate for its conservation and sustainable utilization;

Therefore be it resolved that the American Institute of Biological Sciences asks the Congress of the United States to approve legislation that will:

1. make the conservation of biological diversity a national goal and a national priority;
2. require biological diversity to be a paramount consideration in land-use planning;
3. support efforts to understand biological diversity by creation of a National Center for Biological Diversity;
4. to put our scientific knowledge to use in developing a Federal Biodiversity Strategy aided by a National Scientific Advisory Committee on Biological Diversity;
5. increase support for basic and applied research in systematics, organismal biology, and ecology.

Resolution 2: CONSERVATION OF BIOLOGICAL DIVERSITY

WHEREAS, biological diversity is indispensable to the natural functioning of ecosystems, provides raw materials, products, and ideas for human civilization, and provides aesthetic pleasure, emotional well-being, and spiritual enlightenment, and

RECOGNIZING that the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate is projected to greatly increase over the next several decades, and

RECOGNIZING that the deterioration of the biological diversity of the planet is a significant concern of scientists and a serious problem for humanity, and

WHEREAS, present scientific understanding of the components of biological diversity is inadequate for its maintenance and sustainable use,

THEREFORE BE IT RESOLVED that the American Ornithologists' Union asks the Congress of the United States to approve legislation that will (1) make the conservation of biological diversity a national goal and a national priority, (2) require biological diversity to be a paramount consideration in Federal land-use planning, and (3) support

efforts to understand biological diversity by creation of a National Center for Biological Diversity, a National Scientific Advisory Committee on Biological Diversity, and increased financial support for basic scientific research in systematics, organismal biology, and ecology, and

THEREFORE BE IT FURTHER RESOLVED that the American Ornithologists' Union supports a bill introduced in the 100th Congress, H.R. 4335 and similar future legislation that will achieve these goals.

MARY H. CLENCH, PRESIDENT
1408 OAK HOLLOW DRIVE
DICKINSON, TEXAS 77539
PHONE 713-534-3087

JON C. BARLOW, FIRST VICE PRESIDENT
DEPARTMENT OF ORNITHOLOGY
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ROBERT D. BURNS, TREASURER
BIOLOGY DEPARTMENT
KENYON COLLEGE
GAMBIER, OHIO 43022
PHONE 614-427-2244

10 July 1988

The Honorable Robert Roe, Chairman
Committee on Science, Space, and Technology
United States House of Representatives
Washington, D.C. 20515

15 38

Dear Representative Roe:

At our recent Centennial meeting, the members of the Wilson Ornithological Society passed the following resolution in regard to H.R. 4335 which we would like to bring to your attention:

WHEREAS, biological diversity is indispensable to the natural functioning of ecosystems, provides raw materials, products, and ideas for human civilizations, and provides aesthetic pleasure, emotional well-being, and spiritual enlightenment, and

WHEREAS, the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate appears certain to increase greatly over the next several decades, and

WHEREAS, the deterioration of the biological diversity of the planet is a significant concern of scientists and a serious problem for humanity, and

WHEREAS, present scientific understanding of the components of biological diversity is inadequate for its conservation and sustainable use,

THEREFORE BE IT RESOLVED that the Wilson Ornithological Society asks The Congress of The United States to approve legislation that will: make the conservation of biological diversity a national goal and a national priority; require biological diversity to be a paramount consideration in Federal land-use planning; and support efforts to understand biological diversity. We ask that this legislation create a National Center for Biological Diversity, a National Scientific Advisory Committee on Biological Diversity, and provide increased financial support for basic scientific research in systematics, organismal biology, and ecology.

Sincerely yours,

CENTENNIAL MEETING
8-12 June 1988, Philadelphia, PA

Mary H. Clench, Ph.D.
President

ANNUAL MEETING
1989, Notre Dame, IN

Animal Behavior Society Members:

NOTE: THIS RESOLUTION HAS BEEN PRESENTED TO THE ANIMAL BEHAVIOR SOCIETY FOR ACTION AT THE 1988 ANNUAL BUSINESS MEETING:

CONSERVATION OF BIOLOGICAL DIVERSITY

WHEREAS biological diversity is indispensable to the natural functioning of ecosystems, provides raw materials, products, and ideas for human civilization, and provides aesthetic pleasure, emotional well-being, and spiritual enlightenment, and

WHEREAS the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate is certain to greatly increase over the next several decades, and

WHEREAS the deterioration of the biological diversity of the planet is a significant concern of scientists and a serious problem for humanity, and

WHEREAS scientific understanding of the components of biological diversity is inadequate for its conservation and sustainable utilization,

THEREFORE BE IT RESOLVED that the Animal Behavior Society asks the Congress of the United States to approve legislation that will make the conservation of biological diversity a national goal and a national priority, require biological diversity to be a paramount consideration in Federal land-use planning, and support efforts to understand biological diversity by creation of a National Center for Biological Diversity, a National Scientific Advisory Committee on Biological Diversity, and increased financial support for basic scientific research in organismal biology, ecology, and behavior.

(ADDITIONAL MATERIALS PERTAINING TO THIS RESOLUTION ARE POSTED FOR REVIEW)

Whereas biological diversity is indispensable to the functioning of ecosystems, provides raw materials, products, and ideas for human civilization, and provides esthetic pleasure, emotional well-being, and spiritual enlightenment;

Whereas the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate is certain to greatly increase over the next several decades;

Whereas the deterioration of the biological diversity of the planet is a significant concern of scientists, and a serious problem for humanity;

Whereas, The United States is being asked to take a leadership role internationally, but does not have a Federal policy toward conservation of biological diversity;

Whereas, scientific understanding of the components of biological diversity is inadequate for its conservation and sustainable utilization;

Therefore be it resolved that the Cooper Ornithological Society asks the Congress of the United States to approve legislation that will make the conservation of biological diversity a national goal and a national priority, require biological diversity to be a paramount consideration in Federal land-use planning, and support efforts to understand biological diversity by creation of a National Center for Biological Diversity, a National Scientific Advisory Committee on Biological Diversity, a program in conservation biology at the National Science Foundation, and increased financial support for basic scientific research in organismal biology and ecology.

AMERICAN SOCIETY OF PLANT TAXONOMISTS

June 3, 1988

The Honorable James Scheuer, Chairman
Subcommittee on Natural Resources, Agricultural Research, and Environment
Committee on Science, Space and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Representative Scheuer:

It is a great pleasure for me to write in support of H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act. As President of the American Society of Plant Taxonomists (ASPT), I would like to indicate some of the reasons why this particular bill is extremely beneficial for our country.

As you are well aware, because of the increasing human population, pressure on our native biota both within the United States and in tropical regions is increasing. We can see the clear effects in this country through the intensive colonization by Europeans over several centuries. We still have natural preserves due to enlightened state and national park systems that were developed in the early part of this century. In areas of the tropics, however, we still have vast areas (such as in Amazonia) which have been poorly inventoried and which may become destroyed before we can assess the economic potentials of the plants in the regions.

It is particularly important that we properly inventory the biotic resources within the United States at the present time. We have reached a point where for effective land management, which includes decisions on the setting up of recreational and natural areas, the development of timber resources, use for agricultural purposes, mining and other soil and surface interests, and even for investors and other developers, it is most important that we have a careful data base for all of the biota of this country. The establishment of a National Biological Diversity Conservation and Environmental Research Act would be an extremely positive step forward to project us into a new phase of land usage in this country. As you probably know, the U.S.S.R., Europe, and most of China have detailed inventories of the plants growing in their region. This is particularly well executed for the Soviet Union and enables them to know what species are rare, endangered, common, weedy, and sets the stage for exploring their economic potentials for esthetic, medicinal, food, fiber, and other uses. Because we are still unable to say accurately what plants grow in what regions in the United States and what their values really are, we cannot exploit the economic potentials that we have in this country from our biota. It is most important that we move ahead by supporting H.R. 4335.

There is also another very important reason why this house bill is very important for society in the United States. The development of a strong inventory of biotic resources is a preliminary to developing an important

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Past-President:
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Claremont, CA 91711
714/626-3489

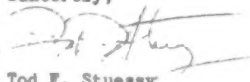
Page 2

classification based on evolutionary relationships of all the plants and animals found in this biotic province. The ability to ask focused questions for the purposes of economic potentials, particularly in the finding of new drugs to fight cancer and other dreaded diseases, is dependent on having the data base to allow such classifications to be formulated. Furthermore, at a more scientific level we will be able to ask more focused questions on biogeography and evolutionary processes, all of which can have a positive feedback to the development of new economic crops through more successful breeding programs using insights derived from analyses of the natural evolutionary processes on Earth. This is an extremely important point and goes way beyond the development of just the data base of information alone.

A further point is that the computer technology of both hardware and software now exist to allow data-basing to be done effectively. As no country in the world has yet produced a computerized data base of its biotic resources, this would allow the United States to take a leadership role and not only use the information more effectively once tabulated, but also to serve as a model for the development of similar programs world-wide. There are some countries which have made some progress, such as in South Africa, Australia, and so on, but none the size and magnitude represented by the United States.

In summary, I hope that you will strongly endorse H.R. 4335 for the establishment of the National Biological Diversity Conservation and Environmental Research Act. The American Society of Plant Taxonomists stands ready to support this in every way possible for we believe strongly that it will be in the best interests of society in this country and in the world for such an act to be implemented and established within our government. I will be pleased provide additional testimony or additional facts in any way necessary in support of the bill.

Sincerely,


Tod F. Stuessy
President

cc: Daniel Crawford, President-Elect
Dr. David E. Blockstein
Dr. Dieter Wilkin

NATIONAL RESEARCH COUNCIL

COMMISSION ON LIFE SCIENCES

2101 Constitution Avenue Washington, D.C. 20418

BOARD ON BASIC BIOLOGY

June 21, 1988

Dr. David Blockstein
Natural Resources Subcommittee
388 HOB Annex 2
Washington, D.C. 20515

Dear David:

Enclosed you will find a statement on H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act, that has been endorsed by the following members of the Club of Earth:

Jared Diamond
UCLA

Harold A. Mooney
Stanford University

Paul Ehrlich
Stanford University

Ruth Patrick
Academy of Natural Science
Philadelphia, Pennsylvania

Thomas Eisner
Cornell University

Peter H. Raven
Missouri Botanical Garden

G. Evelyn Hutchinson
Yale University

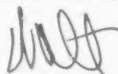
Edward O. Wilson
Harvard University

Ernst Mayr
Harvard University

Charles Michener couldn't be reached.

I suggest you talk to Peter Raven about how this statement gets released.

Best wishes,



Walt Rosen

STATEMENT ON H.R. 4335 BY MEMBERS
of the
CLUB OF EARTH*

The undersigned members of the Club of Earth are pleased to endorse H.R. 4335, the National Biological Diversity Conservation and Environmental Research Act, and to commend its sponsors for their concern with the protection of biological diversity.

In a press release issued in September 1986, in connection with the National Forum on Biodiversity sponsored by the National Academy of Sciences and the Smithsonian Institution, we noted that the loss of biological diversity represented a threat to human welfare second only to all out nuclear warfare. In the eighteen months since that statement was issued, nothing has happened to change our view of the danger posed by the accelerating rate of species extinctions. We are heartened, however, by the growing public and governmental awareness of the biodiversity crisis.

The proposed legislation places the conservation of biodiversity firmly at the center of our commitment to environmental protection, reflecting growing congressional awareness of the global threats to biodiversity and of the importance of biodiversity for human well being. We congratulate the sponsors for their awareness of the importance of this issue, and for their willingness to translate this awareness into meaningful legislation. In so doing they are serving well not only the national interest, but the best interest of all of humankind.

* The Club of Earth is a group of biologists, all members of the National Academy of Sciences, who speak out occasionally on pressing environmental issues.



New York Rainforest Alliance

"Interdependence and Responsibility"

26 May 1988

Hon. James H. Scheuer
Chairman, Natural Resources Subcommittee
Committee on Science, Space & Technology
U.S. House of Representatives, 386 H.O.B. Annex 2
Washington, D.C. 20515

Dear Congressman Scheuer:

I am writing on behalf of the Rainforest Alliance to formally thank you for your pioneering work on the National Biological Conservation and Environmental Research Act (H.R. 4335).

We are impressed with the content of the Act and hope that our Congress quickly realizes the necessity for strong safeguards in national biological diversity. For too long our rich natural environment has been taken for granted, and if acts like the one you propose are not implemented soon, the consequences could be critical. Your foresight in preventing such consequences is to be commended. We are also encouraged that within the bounds of paper changing hands in Washington a bill as important as this one is being circulated to the politicians who need to be so acutely aware of conservation and biological diversity, and the need to make both of them national priorities.

As an organization that spends every day thinking and talking about rainforests, the vast amount of species living within them, and the tragic losses as a result of deforestation, we are strongly in favor of this bill. How can we continue to tell people in developing tropical countries that they should preserve their own natural resources if we cannot as a nation agree to protect our own. Once again, we are back to the "do as I say, not as I have done, and am continuing to do" syndrome.

The Rainforest Alliance, staff and members, would like to work for the passage of this bill. Please let us know how we can help. Additionally, please thank your colleagues for their work on this important issue.

We look forward to a speedy passage of the National Biological Diversity Conservation and Environmental Research Act.

Sincerely,

Daniel R. Katz
President



National Council of State Garden Clubs, Inc.

June 25, 1988

Honorable James H. Scheuer
Chairman, Natural Resources Subcommittee
Committee on Science, Space & Technology
U.S. House of Representatives, 388 H.O.B. Annex 2
Washington, D.C. 20515

Dear Congressman Scheuer:

This letter is on behalf of The National Council of State Garden Clubs, Inc., in appreciation of your work on the National Biological Diversity Conservation and Environmental Research Act, H. R. 4335.

The contents and scope of the Act is comprehensive and emphasizes the "objects" our 350,000 member organization supports. We are deeply concerned about all it covers. Would like to emphasize the following:

- Need to preserve the ecological bases of our culture, and provide that it be adequately enforced.
- Need to recognize the grave impending catastrophies of toxic and other pollution to the habitat, and global climatic changes.
- Need for an emphatic federal strategy conservation program that provides diversity protection in which any decreases in species or habitat viability be considered a violation of Act H.R. 4335.
- Need to increase public understanding of the challenge facing the United States and the earth with biological diversity. We have a Biological Diversity program in Pennsylvania. Advisors state our experience further emphasizes the need for the program to be nationwide, worldwide!
- Need to encourage all levels of our educational systems and other institutions to further educate students and the general public.

The National Council of State Garden Clubs, Inc. strongly supports H.R. 4335. We thank you for the work of the Committee and for its endorsement of this vital program. We would be pleased to be of any service with your work on this important Act.

Sincerely,

G. Richard Dew

Mrs. G. Richard Dew
931 Colonial Club Drive,
Harrisburg, PA 17112
717 545 7754

pc:Mrs. Carroll O. Griffin
President NCSGC
839 Riverbend Blvd.
Longwood, FL 32779
-Mrs. C. Manning Smith
1st Vice President, NCSGC
P.O. Box 450, Charles Town, WVA 25414



WWF World Wide Fund
For Nature

14 June 1988

Congressman James H. Scheuer
2402 Rayburn Building
Washington, D.C. 20515

WWF International

CH-1196 Gland, Switzerland
Telephone (022) 64 71 81
Telegrams: Panda, Gland
Telex: 419 618 ww1 ch
Telefax: (022) 64 42 38

Dear Congressman Scheuer -

During the hearing on H.R. 4335, you asked for additional information on international activities which might be of help in convincing your colleagues that biological diversity is an issue of global importance.

As Mark Plotkin explained, WWF is active internationally in this area. I just wanted to add that the 23 national organizations of WWF have selected biological diversity as their major fund raising and awareness theme for the next five years. The campaign will feature three main aspects of the issue: health, food and industry. Mark Plotkin and Russ Mittermeier of WWF-US can give you more details of the conservation programme on which this campaign is based.

We discussed briefly the recent initiative on the conservation of medicinal plants by WWF, IUCN and WHO, which both Mark Plotkin and I attended. This led to the Chiang Mai Declaration and a subsequent WHO General Assembly resolution, both enclosed. The recognition of the World Health Organization of the importance of biological diversity to health certainly adds additional strength to the voices of the conservationists.

I hope this will be useful.

Yours sincerely,

Paul Wachtel

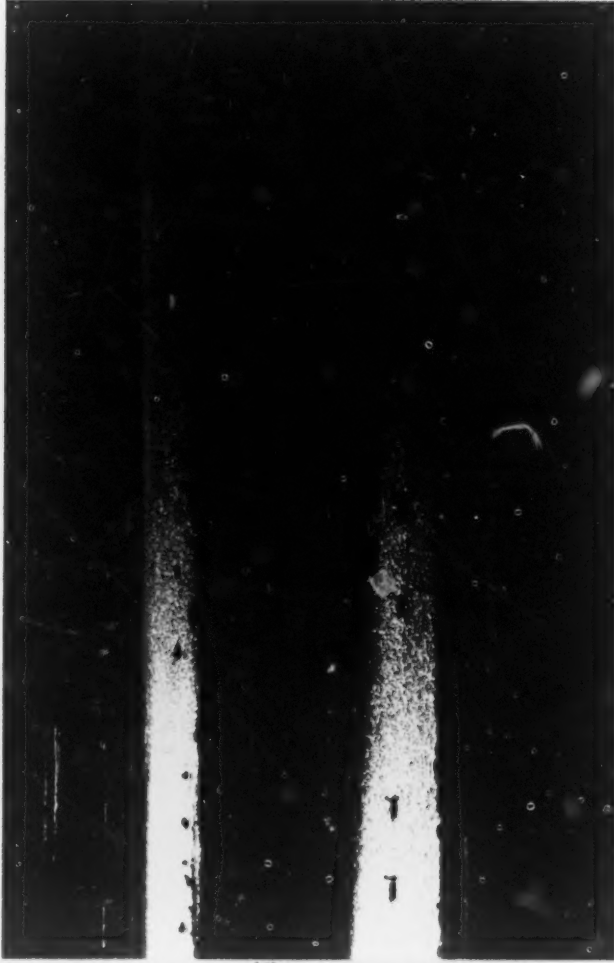
Paul Wachtel
Head, Creative Services

cc Mark Plotkin

Registered as
WWF - Fondo Mondiale per la Natura
WWF - Fondo Mundial para la Naturaleza
WWF - Fonds Mondial pour la Nature
WWF - Fondo Mundial para a Natureza
WWF - Welt Natur Fonds
WWF - World Wide Fund For Nature
(formerly World Wildlife Fund)

President
H R H The Duke of Edinburgh
Vice Presidents
H H Prince Sadruddin Aga Khan
Dr Luc Hoffmann
Dr Anton Rupert
Hon. Treasurer: John E. Nash
Director General: Charles de Haes

Executive Summary



The Maryland Natural Heritage Program

The Maryland Natural Heritage Program

370

Table of Contents

This program was developed by the
 Maryland Department of Natural Resources
 James B. Coulter, Secretary
 Fred L. Eskew, Assistant Secretary for Capital Programs
 and
 The Nature Conservancy
 Robert E. Jenkins, Vice President for Science Programs
 The Maryland Natural Heritage Program
 George H. Fenwick, Program Coordinator

Preface	1
Program Overview	2
Program Accomplishments	5
Program Recommendations	10
The Future of the Program	12

Preface

"Maryland," wrote Forrest Shreve in *The Plant Life of Maryland* in 1910, "is so carved out as to comprise a diversity of natural conditions out of all proportion to its area." From the Allegheny Plateau's boreal bogs to cypress swamps along the Potomac River, from the rare serpentine barrens of the Piedmont to the shale barrens of the Ridge and Valley Province—Maryland still encompasses a surprising range of natural communities. This outstanding heritage, however, is increasingly threatened by population and land-use pressures.

In 1979, the Maryland Natural Heritage Program was established by The Nature Conservancy and the Maryland Department of Natural Resources to identify the state's significant natural areas and set priorities for their protection. Its continuously updated inventory provides information on all rare, endangered, and threatened species as well as unique and exemplary natural communities. Complementing related activities in the state, the Heritage Program serves as an important aid in making land-management decisions of all types. The Maryland program is a "model" Heritage Program—the result of a two-year Nature Conservancy endeavor to apply all it had learned about Heritage methodology from the experiences of some thirty existing state programs. The inventory and data management techniques developed for the model Maryland program are now being used as the template for Heritage Programs across the country.

The Maryland Natural Heritage Program Executive Summary presents the highlights of the program to date: its purpose, methodology, accomplishments, and recommendations. Prepared by the Heritage Program and The Nature Conservancy, it was financed by a grant from the United States Department of the Interior (under the provisions of the 1965 Land and Water Conservation Fund Act), by the Maryland Department of Natural Resources, and by a grant to the Conservancy from the Andrew W. Mellon Foundation.



Program Overview

Why Preserve Diversity?

In 1980, the Council on Environmental Quality produced the *Global 2000 Report to the President*. Among its conclusions was that "15-20% of all species on earth could be extinguished by 2000, mainly because of loss of wild habitat, but also in part because of pollution. Extinction of species on this scale is without precedent in human history."

By reducing biological diversity, humanity is eliminating the storehouse of organisms upon which we depend for food, medicine, industry recreation, and countless other benefits. Science is discovering the unique values of little-known species with amazing regularity. For example, a close relative of corn, *Zea diploperis*, was recently discovered in Mexico. Unlike corn, it is a perennial. Hybridization between corn and this species, known on only three threatened sites in the world, could produce a perennial variety of corn with increased virus resistance or the ability to grow in wet soils. Disease-resistant barley has been created in the same way. We could fill pages with success stories of this kind.

But why protect all species simply because some have proven invaluable? Since no one can predict which species will provide benefits in years to come, it is only prudent to protect the full range of living things. Who could have predicted that blood cells from the horseshoe crab, *Limulus polyphemus*, would be used to improve testing for bacterial endotoxin, or that a life-saving drug would be found in tosglove, *Duglalis purpuraria*? Of course, material benefits are only one reason for preserving species

diversity. Public sentiment in favor of nature conservation reflects a philosophical commitment to valuing the quality of all life.

The goal of the Maryland Natural Heritage Program is to preserve the state's natural diversity by identifying outstanding natural areas and setting priorities for their protection. The Heritage inventory continuously gathers and refines information on the location and status of vulnerable plant and animal species and biotic communities. These inventory targets are known, in Heritage parlance, as the "elements" of natural diversity. An element can be a Swainson's warbler, a green salamander, a Maryland bay mangrove, a white cedar swamp, or a cave.

The focus on elements—the biological entities which we wish to see protected—rather than tracts of land is the key innovation of the Heritage process. Unlike previous inventories, which asked "What are the state's unique natural areas?"—the Heritage inventory asks, "Where are the various elements of natural diversity, and which are in the greatest need of protection?" The Heritage inventory can offer lesser-known areas with valuable features the attention that they deserve. Too often, site inventories have emphasized broadly applicable selection standards such as degree of disturbance, size, or scenic value at the expense of natural diversity. Whereas the results of a site inventory are compiled into a "bookshelf" final product that's quickly outdated, a Heritage Program's product is the ever-current inventory itself. Protection priorities are set and reset, according to the most up-to-date data on the state's natural diversity

The importance of accurate information cannot be overemphasized. By drawing on Heritage Program data, planners, developers, and government officials can better judge a project's impact before decisions are made and funds allocated. Because it is far less expensive to avoid land-use conflicts before they occur than to remedy them afterward, easily accessible Heritage information is an efficient, economical planning tool for development and environmental interests alike.

Upland sandpiper



Bakam and Swallow

genous species will be conserved. This "coarse filter" approach must be coupled with "fine filter" efforts to safeguard the rarer ten percent of species whose protection may not be ensured at the community level. As more information is gathered, the classification lists are refined. Elements are ranked according to their rarity as follows.

- A1 = Critically endangered throughout range, e.g. *Phlox pilularis* (harperella), *Elaeagnus* (Maryland darter)
- A2 = Endangered throughout range, e.g. *Hedysarum* (Swamp pink), *Scirpus nigrescens* (Delmarva fox squirrel), shale barren
- AX = Apparently extinct throughout range, e.g. Labrador duck
- B1 = Threatened throughout range or critically state endangered, e.g. *Pseudotsuga menziesii* (mountain pimpernel), *Myotis sodalis* (Indiana bat)
- B2 = State endangered, e.g. *Gentiana* (fringed gentian), *Rana nigralipes* (carpenter frog), mountain peatland
- B3 = State threatened, e.g. *Althysia* (swamp sparrow)
- BU = Possibly in peril, need more information, e.g. *Clintonia*, *Ammodramus* (Henslow's sparrow)
- C = Apparently secure in state and throughout range, e.g. *Jeffersonia* (whiteleaf), *Nolina* (stonecat), alder/viburnum swamp
- D = Demonstrably secure in state and throughout range, e.g. *Quercus alba* (white oak)



Inventory and Classification

It is important to realize that the inventory process is the product. The guiding principle of the Heritage concept is to provide an information-gathering system that accurately reflects the changing character of the natural landscape. The inventory has no end, its timeliness, flexibility, and efficiency stem from the fact that it is continually updated.

A major task of the Heritage Program is to integrate information available in literature and unpublished materials, through contact with natural resource professionals, conservationists, and other people who know the natural history of the state, from herbaria, museums, and other secondary sources. By bringing all of this material together in a single data base, Heritage scientists can compile lists of elements and develop a classification system.

The classification system includes the following element types: SPECIAL PLANTS (SP) and SPECIAL ANIMALS (SA) are species which are rare or

local in occurrence. NATURAL COMMUNITIES (NC) are characterized and defined by physiography, vegetation structure and composition, topography, substrate, and soil moisture and reaction. Examples are mountain peatlands, cypress swamps, or caves. PLANT COMMUNITIES (PC) are those communities that can be defined by the plant species dominant in the canopy and understory levels. Examples are *Spartina patens*/Distichlis spicata (a marsh plant community type) or *Acer rubrum* (a red maple forest). A salt marsh NC can be composed of several or many PCs such as *Spartina patens*/Distichlis, *Typha latifolia*, and *Scirpus fluitans*.

Whereas only rare or locally occurring plant and animal species are included in the special plant and special animal classifications, examples of all community types—commonly occurring as well as rare—are listed. The underlying assumption here is that if good examples of all major community types are represented in the state's conservation areas, then most (perhaps 90 percent) of the full array of indi-

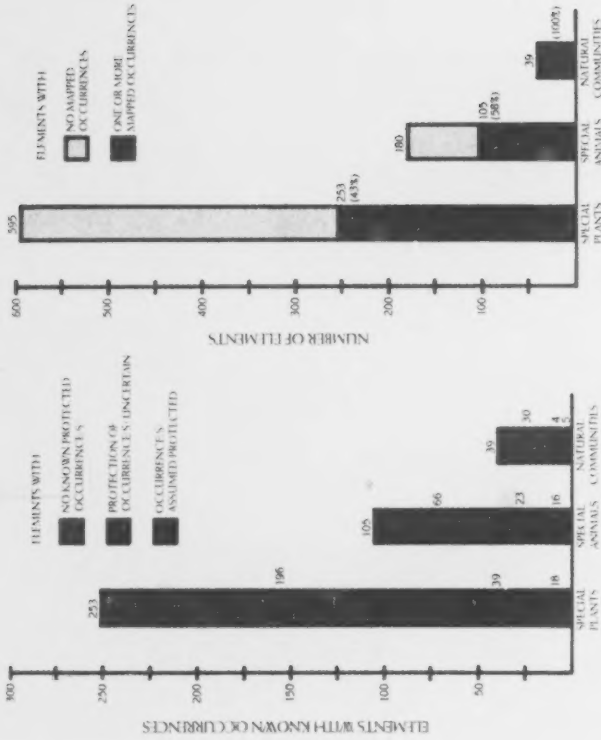


Figure B

Figure A

Priorities for field surveys to close information gaps are set according to these rankings. Many elements are found to be more common than previously believed and are consequently dropped from the lists (or added to a "watch list"). Occasionally elements not previously known in the state are located and added to the lists.

The Heritage data base now has occurrence information on 751 sites of 253 special plants, 488 sites of 105 special animals, and 89 sites of 39 communities. More than 1,300 element occurrences have been tabulated thus far. Future field work may soon double or triple this number.

Cross-referenced files keep Heritage information readily available for analysis. The interlocking file structures include a map file containing element-occurrence data recorded on 7.5° U.S. Geologic Survey topographic maps covering the entire state, a manual geographic file with detailed information on each mapped occurrence, a manual element file for additional information that is not site specific, and a computer file that enables rapid retrieval of element, element occurrence, managed area, and source information. Other files include a managed area file providing information on all areas with some degree of conservation protection, and a source file to provide research leads.

In conjunction with the Heritage library and element logbooks, which summarize occurrence information on an element-by-element basis, the Heritage files provide an integrated, efficient information management system.

The charts at right show the number of elements by class, noting those with mapped occurrences, and the protection status of elements.

Program Accomplishments

The Status of Natural Diversity in Maryland

The best means of judging the Heritage Program's success to date is to compare aims with accomplishments. The contract creating the Maryland Natural Heritage Program set precise goals to systematically identify natural areas with significant species and biotic communities, and to recommend appropriate ways to ensure their protection.

During the two-year pilot phase of the program, considerable progress has been made in information collection and data analysis. The inventory already serves as a functioning ecological survey containing more biological data on Maryland's natural diversity than is available anywhere else. If the data base is to continue serving the state's land management decision-makers in this way, it must be kept current. Its greatest accomplishments lie in the future.

The Heritage system contains 814 elements, in three classes. One or more occurrences have been identified for 49 percent of these elements. In research to date, emphasis has been placed on data acquisition for SPs, SAs, and those NCs considered most fragile or imperiled.

The first priority of the program's community ecologist is to inventory community types that are nationally or regionally threatened. Chief among these in Maryland are serpentine barrens and shale barrens. Few viable serpentine barrens remain in the state. Important serpentine barrens in Montgomery, Baltimore, and Harford counties have been destroyed, severely disturbed, or are threatened by development. A large, relatively undisturbed barren in Cecil

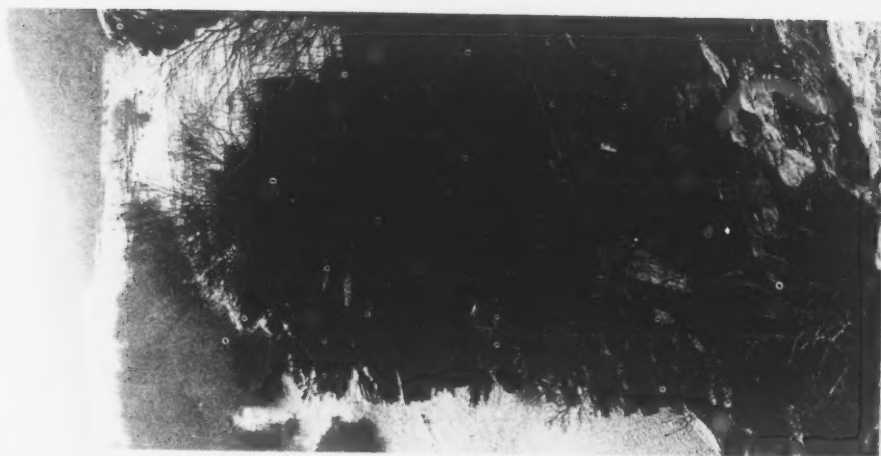
County has been identified as a priority preservation target. There are still many shale barrens of diverse size and quality remaining in Allegany and Washington counties, but none is now adequately protected. As more shale barrens have been entered into the data base, it has become apparent that we must protect several occurrences to represent the full array in Maryland.

A second priority is to inventory for community types that are rare in the state. Several wetland types, such as mountain and coastal plain peatlands, fit into this category. Each of these is restricted to a limited range in Maryland but harbors ensembles of rare plant and animal species. Some community types such as caves and limestone cliffs are not considered rare in the state but have been extensively inventoried because of the number of unusual species which occur in or on them.

The third task of the ecologist is to record at least a single high-quality example of each community type that is being protected in the state. There are examples of more common systems—such as subtidal shoals and flats, intermittent streams, and some woodland types—are included in the system. Searching for these examples sometimes reveals that some common community types are not well protected. For example, in the Piedmont physiographic province, protected woodlands are all in stream valleys—none on the rolling uplands.

The plant life of Maryland is extremely diverse. Despite its comparatively small size, Maryland sup-

Maryland Habitat and Fauna, Koenig





This map of Maryland shows the state's division into four physiographic provinces. The number of element occurrences catalogued by the Heritage Program for each of these provinces follows: Allegheny Plateau, 251; Ridge and Valley, 280; Piedmont, 268; Upper Coastal Plain, 208; Lower Coastal Plain, 423. The dots on the map pinpoint sites for which the Heritage Program recommends protection.

ports nearly 2,900 species of vascular plants. A major reason for the state's richness in flora is that the northern and southern distributions of many plant species overlap in this region. Many southern plants, such as bald cypress (*Taxodium distichum*), swampbay (*Persea borbonia*), and spreading pogonia (*Leitis discolorata*), range up the Coastal Plain to include Maryland. Many typically northern plants range south along the sub-continental divide of the Allegheny Mountains, and their distribution ceases at or near Maryland. Plants such as larch (*Larix laricina*), buckbean (*Menyanthes trifoliata*), small cranberry (*Vaccinium oxycoccos*), and early coralroot (*Corallorhiza trifida*) are but a few examples.

Of the state's vascular plants, 550 (19 percent) are rare or warrant special consideration. Twenty of these may already be extirpated from the state; most of the 20 (including arethusa (*Arctostaphylos*), swamp pink (*Hedysarum bellidifolium*), and showy lady's slipper orchid (*Cypripedium reginae*)) were previously found in swamps and bogs—community types that have been drastically reduced in Maryland. Two hundred and fifty species (45 percent of the total list of special plants) are known from only one occurrence. Several are habitat specific, found only on serpentine outcroppings, limestone cliffs, shale barrens, or mountain peatlands. Others warrant further research to determine their true endangerment status.

The Heritage Program keeps files on the rare non-vascular plants found in this state. These include mosses, liverworts, and lichens. However, only a few species are known well enough to establish as special plants in Maryland.

The Maryland Natural Heritage Program manages information on 174 animal taxa: 57 invertebrates (including mollusks, crustaceans, and insects), 26 fishes, 11 amphibians, 17 reptiles, 42

birds, and 21 mammals. Of these, the invertebrates and fishes are least known, 34 of the 83 taxa in these two groups have no known occurrences in the state to date. Sixteen invertebrate species are cave- or spring dwellers. Most are endemic to the restricted limestone areas of Pennsylvania, West Virginia, Virginia, and Maryland. In Maryland, Franz's cave scud (*Stygobromus franzii*) is only known from three caves in the Appalachian Province. There are two endangered mollusk species in the state: the ancient floater (*Aluminaia batradiana*) and Rader's snail (*Glyphyalinia raderi*).

Pollution and loss of habitat are the primary causes of the decline of Maryland's ichthyofauna. Of the 74 species native to Maryland, 26 are listed by the Heritage Program. Thirteen are found in the Coastal Plain, most of the others inhabit the upper Potomac drainage. The short-nosed sturgeon (*Acipenser brevirostrum*) is the only anadromous fish that is truly endangered in the state. Over-fishing in the early 20th century and damming are the probable causes. The Maryland darter (*Etheostoma caeruleum*), a federally listed endangered species, is known from only two tributaries of the Susquehanna River.

Of the 28 reptiles and amphibians in the Heritage inventory, 16 are restricted to the Coastal Plain. Their habitat has been lost to drainage projects. Most of the 28 are peripheral or distinct species, occurring in localized colonies. Notable examples are the green salamander (*Ambystoma opacum*), restricted to the Pottsville sandstone outcrops of the Appalachians, and the bog turtle (*Clemmys muhlenbergi*), which inhabits bogs, swamps, and streams in patches from New York to North Carolina. Overcollection and urbanization continue to threaten these species. In 1972, the secretary of the Department of Natural Resources revised the state's Endangered Species Act to include nine reptile and amphibian species.

Good information exists for most of our 42 bird species. The Chesapeake Bay area provides beach, bay, and marsh habitat for 20 species of colonial nesters, raptors, and waterfowl. Our knowledge of colonial breeding sites, in particular, is much improved. For example, the staff has discovered that the great blue heron (*Ardea herodias*) is more common than was thought a few years ago. Also, in 1981, the Chesapeake Bay area had the best news in 20 years on bald eagle (*Haliaeetus leucocephalus*) nesting. Ninety-three nests were recorded, 30 of them in Maryland. On the other hand, it was found that the red-cockaded woodpecker (*Picole borealis*), also endangered, is indeed rare—as its habitat is restricted to loblolly pine woods at least 40 years old. Only one nest of this species has been located (only to be lost to timbering) since the 1950s. The woodpecker's decline is directly traceable to the removal of the older, diseased trees it prefers for its nest holes.

On the whole, Maryland's mammals are more northern than southern in distribution. Of the 21 species in the Heritage inventory, 10 are found only in the state's Appalachian Province. Five other species are probably here but have not been found to date. Bats appear to be the most highly threatened, owing in part to the specificity of their cave habitat. The Indiana bat (*Myotis sodale*), a federally listed endangered species, is found in two caves in Maryland. A small breeding population of black bears (*Ursus americanus*), which require large tracts of forested habitat, has recently been documented in the mountainous western section of the state. The remaining mammals listed by the Heritage Program are rare because they exist in disjunct or peripheral distributions in Maryland. Future field work should yield range extensions for some of these, such as the water shrew (*Sorex palustris*) and the northern flying squirrel (*Glacomys sabineus*).



Protection Planning

Given the sound data base developed by the Maryland Natural Heritage Program, state government and private conservation organizations have a variety of techniques open to them in their efforts to protect as much as possible of Maryland's rich natural heritage. A brief description of protection-planning methods is presented below.

Acquisition of fee title. through donation or purchase is commonly used to protect natural areas in Maryland. Because a high degree of protection over a long period of time is likely with this technique, it is preferred whenever possible. Landowners, wishing to assist in natural-area protection, may sell ecologically significant land to the state or a conservation group such as The Nature Conservancy at a price below its appraised value. Often the seller can realize tax benefits by this means.

Since the outright acquisition of natural areas is not always possible—and not always practical—more limited "layers of protection" come into play. These vary according to cost, effectiveness, duration, and the speed with which they can be used.

For example, in certain cases a simple voluntary agreement may be appropriate. Owners of sites selected by the Heritage Program are approached by the Maryland Natural Areas Registry, which operates out of the Maryland/Delaware Field Office of The Nature Conservancy. The landowners are informed of the existence of an unusual natural feature on their property and are asked to cooperate in its preservation. Though the degree of long-term protection is not great, a voluntary agreement prevents the inadvertent destruction of a significant site. Usually, landowners are asked to notify The Nature Conservancy before they consider selling or altering



Her. Arch.
their properties. In less than a year, this program has "registered" 27 sites for voluntary protection.

Another method for protecting significant natural elements is the use of conservation easements. In essence, a conservation easement is a set of restrictions that a landowner places on his or her property—restrictions that are legally binding on present and future owners. The easement prohibits activities detrimental to the natural values of the land (activities such as cutting trees, building structures, excavating or draining the land). The owner voluntarily gives up some of his or her property rights by transferring them to an organization or govern-

mental body. Although these rights have been sold or donated, the landowner retains title to the property and all other rights inherent thereof.

Dedication is a legal status that confers upon selected lands a strong level of protection. Though no statute for dedication has been approved by the State of Maryland, this method has been very successful in other states and should be considered here. The level of protection afforded significant elements occurring on state landholdings can be effectively upgraded through designation of the areas by the state as "sensitive management areas" or "wildlands." "Sensitive management areas" are areas of natural significance of less than one hundred acres; the "wildlands" designation applies to larger expanses. With its special files on managed areas, the Heritage Program is well-equipped to assist state land managers in identifying sensitive species and communities on all state properties and in designing appropriate management programs. In this way even without added legal protection, the preservation of these elements is enhanced.

All of the techniques outlined briefly above involve protection (by private or state organizations) of identified natural areas—lands known to possess high ecological values. A very different type of protection-planning function is performed by the Heritage Program as part of its regular routine. When the program is asked to review permit applications, state comprehensive outdoor recreation plans (SCORP), and other land-use related documents, it brings to bear high standards of accuracy and a rigorous approach to environmental investigation and planning. This "quality-control" aspect of the program's work avoids the destruction of critical natural areas by making thorough scientific research the rule rather than the exception.



Data Use

The Maryland Natural Heritage Program supplies objective ecological information for two broad purposes: to inform land use decision makers so that conflicts can be avoided, and to identify significant natural areas for protection. Whether the issue is natural area preservation or highway routing, the inventory serves as an invaluable planning tool, enabling Marylanders to assess alternative courses of action before commitments are made.

The number of data requests increases each month. To date, over 150 requests for information have been filled, and this number will grow rapidly as word of the Heritage Program spreads. More than half of the requests have come from state programs for environmental review purposes. Large in-depth reviews have been made of power plant siting proposals in western Maryland, the Carrett County land-consolidation plan, state park gas and oil leasing proposals, and county land use plans. By joining the Upland Natural Areas Study to the Heritage Program, the state environmental review process has been made more efficient.

The Nature Conservancy is using Heritage Program data in two ways: first, to determine top-priority preserve sites for the Conservancy's Maryland Natural Areas Acquisition Campaign, and second, to target several hundred other significant sites for the Maryland Natural Areas Registry Program, which encourages landowners to voluntarily protect the natural values of their properties.

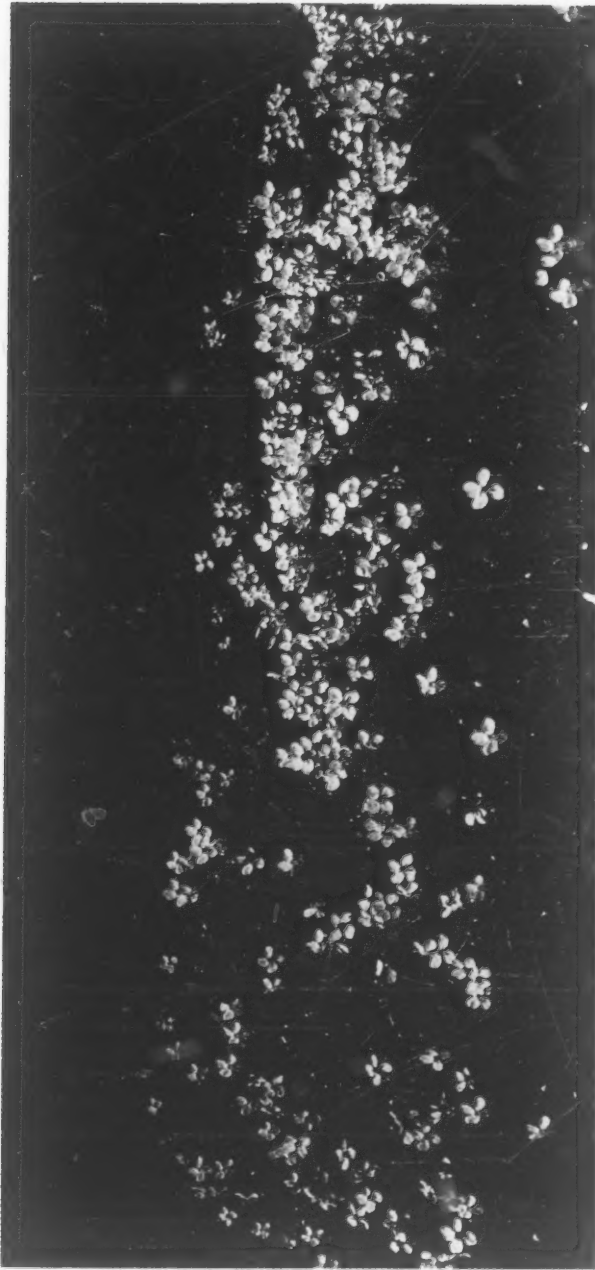
Heritage data are also useful to state land management agencies in determining their protection priorities. It is hoped that Heritage information will help in establishing "wildlands" and "sensitive management areas" on state-owned lands.

Black Bear

Program Recommendations

The preservation of our natural heritage should be the concern of all Marylanders. We cannot continue to change the natural landscape without affecting the stability of our environment and, ultimately, the quality of our lives. In view of this, the Maryland Natural Heritage Program makes the following recommendations to the State of Maryland, its people, and their elected representatives.

- ☐ Increase the emphasis on natural diversity in evaluating natural areas for protection. In a time of decreasing financial and natural resources, Maryland must take a more scientific approach in protecting its diversity of species and communities. Government and private conservation groups should attempt to safeguard at least a portion of all that remains of the state's array of living resources.
- ☐ Continue to study, evaluate, refine, and enrich Heritage data. The value of the Heritage Program's information is becoming increasingly apparent. As word of its availability spreads, the demand for it grows. The Heritage inventory requires continuous fine-tuning; older element occurrences must be verified in the field, and new occurrences must be sought. To maximize efficiency, the Heritage staff should maintain a minimum of four positions.
- ☐ Actively encourage use of Heritage Program data by individuals, agencies, and organizations involved in environmental planning. The Heritage Program has compiled the most comprehensive body of biological information on Maryland's natural environment in existence. Use of this information in the earliest stages of planning and development can save time, money, and—most crucially—key portions of our natural heritage.
- ☐ The Department of Natural Resources should consider the full array of preservation alternatives— from landowner notification to fee-simple acquisition —and choose the appropriate tool to protect natural diversity in each case. No single tool will serve in all conservation efforts. Maryland's heritage can best be preserved through the judicious application of numerous protection methods. The General Assembly can start by enacting legislation providing for a dedication program in the state.
- ☐ State appropriations authorities should increase funding for the protection of natural areas. The timely acquisition of natural areas should be given higher priority in the allocation of public funds. Analysis of the Heritage data base should play a strong role in the site-selection process. It is equally important that funds be identified for the proper stewardship of these areas once they are acquired.
- ☐ Department of Natural Resources agencies, state-supported universities, and other educational institutions should take an even more active role in supporting field biology investigations in Maryland. Field survey efforts must be stimulated and funding for field research (as well as support for university/herbaria/museums) increased. Filling in the gaps in our information represents an opportunity and a responsibility for the state's institutions of higher learning.
- ☐ The Heritage Program should not disseminate specific locational information on fragile features and vulnerable species indiscriminately. Disclosure of specific locations can lead to damage or destruction, and may undermine the mutual confidence now shared by the Maryland Natural Heritage Program and the state's scientific community. Sensitive information should be guarded against the possible abuse of those without the knowledge and commitment to use it constructively.



Marshall Islands - Kwajalein

The Future of the Program

In its first three years of operation, the Maryland Natural Heritage Program has provided a sound and efficient process for identifying significant natural areas in the state. It has saved the state government time and money by offering, in a single integrated system, much of the environmental information Maryland needs to plan wisely and effectively. The growing demand for Heritage data indicates that the inventory's potential is only beginning to be realized.

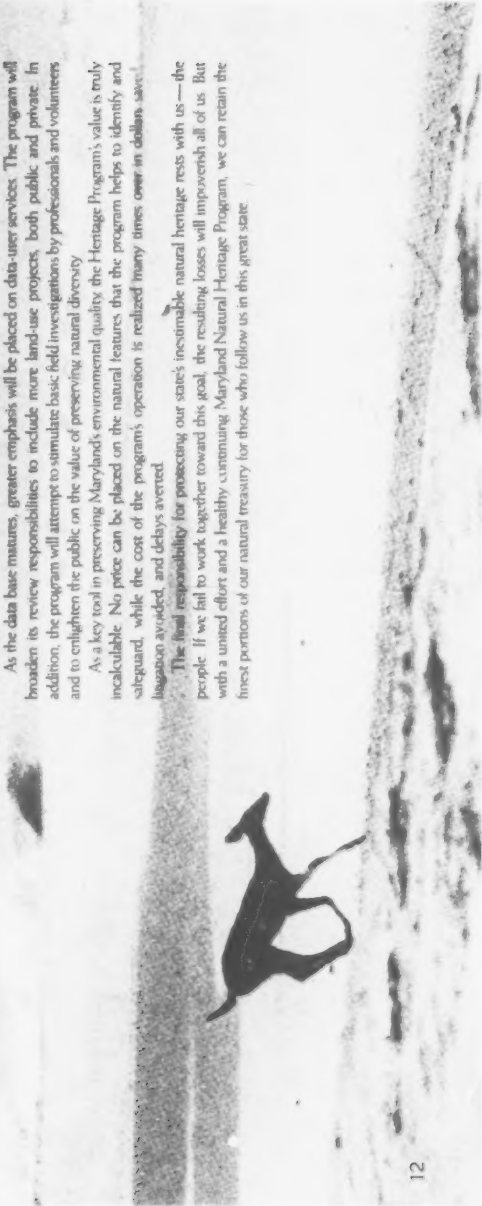
The transfer of the Heritage Program from The Nature Conservancy to the Maryland Department of Natural Resources took place on November 1, 1981. The Nature Conservancy continues to work closely with the Maryland Heritage staff, lending insights gleaned from almost thirty other state programs, making Maryland the national model for innovative Heritage methodology.

In the coming years, the program will meet new challenges and take on new responsibilities. Incorporation of the Upland Natural Areas Study has combined the two most comprehensive environmental information data bases in the state. Data analysis will continue to identify ecologically important sites. Field research will lead to new discoveries, and protection priorities will be set accordingly.

As the data base matures, greater emphasis will be placed on data-user services. The program will broaden its review responsibilities to include more land-use projects, both public and private. In addition, the program will attempt to stimulate basic field investigations by professionals and volunteers and to enlighten the public on the value of preserving natural diversity.

As a key tool in preserving Maryland's environmental quality, the Heritage Program's value is truly incalculable. No price can be placed on the natural features that the program helps to identify and safeguard, while the cost of the program's operation is realized many times over in dollars saved, laughter avoided, and delays averted.

The final responsibility for protecting our state's inestimable natural heritage rests with us—the people. If we fail to work together toward this goal, the resulting losses will impoverish all of us. But with a united effort and a healthy, unending Maryland Natural Heritage Program, we can retain the finest portions of our natural treasury for those who follow us in this great state.





UNIVERSIDAD NACIONAL

"Campus Omar Dengo"

HEREDIA, COSTA RICA

ESCUELA DE CIENCIAS AMBIENTALES

The Honorable James H. Scheuer
Chairman, Subcommittee on Natural Resources,
Agriculture Research and Environment
2466 Rayburn House
Office Building
Washington, D.C. 225-5471
EE.UU.

18 viii 88

Dear Sir:

Thank you for your letter of 9 August concerning HR 4335 and your efforts to establish a national policy for the conservation of biological diversity. Speaking from the perspective of ten year's biological research in Latin America and Africa, the passage of the bill and the establishment of a national policy will benefit both the United States and many other countries.

As you know, the United States, because of its range of latitudes, itself has a very high level of natural diversity. The biodiversity bill is an important first step in preserving our diversity, in a systematic manner, rather than the present admirable, but patchwork efforts of both the federal government and the private sector.

Internationally, the bill has two benefits. It sets an example that governments should approach the biodiversity issue as an essential part of national planning. Passage would send the message to foreign governments and international organizations such as the World Bank that biodiversity is important--a message that many simply haven't heard.

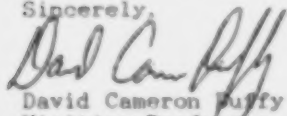
The creation of a National Center for Biological Diversity and Conservation Research would provide research to generate the theory and methodology that we urgently need here in Latin America to maintain biodiversity during development. Tiny countries such as this one (and Costa Rica is relatively well off) simply can't pay for the strategic thinking or development of methods that the United States can. The Center's work would be a much needed helping hand for international efforts to preserve biodiversity.

Finally, from a Central American perspective, I wonder how much different this area's tragic history would have been if biodiversity had been included in the planning of national development schemes. Poverty breeds unrest, and so much of the

poverty here seems to spring from ill-thought out development schemes that maximized short-term gains at the cost of biodiversity and social wellbeing. Our efforts to reduce unrest by uplifting the economic status of peasants and the landless will fail unless these efforts take biodiversity into account. One example may suffice. Before Columbus, the Mayans lived very well on a mixed farming and harvesting economy, supporting very high population densities. They made extensive use of woodlots for hunting and for harvesting the seeds and sap of the Brosimum tree. Woodlots need little upkeep, they don't erode and they maintain a variety of food sources. In at least some areas, modern settlers should be using similar tactics, instead their governments encourage clear cutting and cash crops. This reduces rainfall for farming, water supplies to cities, and makes the settlers dependent on fluctuating (usually depressed) world markets. The people get poorer and the area gets more unstable. The U.S. spends more to prop up or remove governments, and no one benefits. Biodiversity is not the only answer, but it must be one of them.

I wish you success with HR 4335. Our children will thank you.

Sincerely,



David Cameron Duffy Ph.D.
Visiting Professor

P.S. I have enclosed a paper, submitted to Conservation Biology on research strategies for biodiversity in the tropics. It may be of some interest.

submitted: Conservation Biology

BASIC RESEARCH NEEDS FOR TROPICAL CONSERVATION BIOLOGY:
A TIMETABLE

running head: conservation timetable

David Cameron Duffy

address, for proofs and correspondence:

Programa de Vida Silvestre,
Escuela de Ciencias Ambientales
Universidad Nacional, Heredia,
Costa Rica

BASIC RESEARCH NEEDS FOR TROPICAL CONSERVATION BIOLOGY:

A TIMETABLE

Conservation biology owes its existence to many disciplines but can claim its separate identity from its goal of providing the science behind methodologies for preserving biological diversity. As such, conservation biology is very similar in its role to that of medical physiology. Both are valued only in as much as they produce answers to problems. Conservation biology would be irrelevant if it were to develop a fixation on such themes as optimal levels of diversity in natural communities or the relation between stability and energy flow. We must ask what the problems are that need solutions. Simply talking about the general need to preserve biodiversity won't get us far.

We can identify questions that are or will be asked by 'front-line troops', such as wildlands and wildlife managers, rangers, land planners, conservationists, and citizen's groups. I believe these questions will change in relative importance over time in a predictable manner. For some questions, we need answers now; for others we have time to develop research programs that could yield usable answers in time to be used. More important, if we do not answer the first set of questions now, we won't have the opportunity to worry about the others later.

The future of efforts to preserve biodiversity can perhaps be divided into three successive phases: 1) saving remaining 'wild' areas as legally protected areas; 2) maintaining them; and 3) rehabilitating degraded habitats. Much of what I have to

say has been pilfered from many sources and has benefited from discussions with many biologists, park managers, and others, especially in Latin America and southern Africa, so the material itself is not new, but I hope the framework is.

Saving 'wild' areas-- While there is some argument about deforestation rates (Mares 1986), it seems clear that most areas outside of Amazonia will be either agricultural or park by the turn of the century (Myers 1988). In Amazonia, the same may be true by the middle of the next century. This suggests, as a number of authors have pointed out (e.g. Burley 1988; Jenkins 1988), that if we want to set aside reserves, we must identify them and do so, now.

What does this mean for conservation biology? It means that those with the money and political skills to save wild areas need to know what is worth saving and how much of it. We need a competent science of biogeography that can identify different ecosystems and areas of high diversity. We need indicator organisms that reliably reflect diversity in other taxa. We need a population genetics that can speak definitively on minimal population sizes needed to maintain populations. When we don't know the answers, we had better be able to make the best guesses (e.g. Diamond 1986), or conservation biology becomes irrelevant (Soulé 1986).

We need to know now, not in 50 years, what the best size and design for reserves is. While much good work has been done, we have seen an often virulent fight over concepts of reserve size and island biogeography. I wonder if being right is the

best thing to be in this case; especially if it may be too late to do much about it, once the controversy is resolved. Also have those involved in this controversy considered the effects of such infighting on park planners who must sell parks to their governments and citizens? Perhaps we need to minimize risk (whether of reserve design or political failure), rather than minimize scientific error, in park design. What design best keeps our options open for subsequent modification? Perhaps we need a convention, like that of Copenhagen for physicists, to agree on the best model, or best guess, given available knowledge and possibilities.

We need to learn as much as possible now, about how natural habitats work: are there critical "keystone" species associated with different communities; what are normal population fluctuations and are communities ever 'stable' (e.g. Leigh et al 1982); what species pollinate and disperse which plant species; how much genetic diversity is there, especially in big, rare species? We also need to document diversity: how many species do natural environments hold and in what abundance? All this information, often branded 'pure' research, will in time be the scientific basis for the next two phases.

2) Maintaining what is left The next period begins in earnest sometime between today and 50 years from now when most "natural" lands will be in reserves. The main task will be one of preserving what is left. Island biogeography theory (MacArthur and Wilson 1967; Soule et al 1979) tells us that parks will inevitably lose species over time. Perhaps it is more

appropriate, and certainly more optimistic, to paraphrase Luther: all that is necessary for extinction to prevail is for good people to do nothing. Even if island biogeography is right, can't we fool habitat islands into acting biologically bigger than they are? Can extinction be delayed or avoided by judicious management of habitats and populations? For example, transplanting even a very few individuals (one/generation might be sufficient without being too great a challenge: Slatkin 1985) can maintain gene flow; reintroducing key dispersers can prevent the extinction of their food plants; planting key food species, on which communities depend during times of food stress, can perhaps maintain larger populations within reserves, or buffer them against food failures. We need a whole bookful of tricks and we need to get the book written and translated, so the techniques are in the hands of park guards and biologists, not just blissfully preserved in the acid-free pages of technical journals.

-We also must provide justifications for the parks--"just so" stories of the complexity of natural life (Janzen 1986a). We must be careful to show that interesting stories occur even in agricultural or suburban areas, but that nature is even more interesting in the parks. Simply extolling the exotic life within parks will leave the parks being exotic and of little interest to urban dwellers who may never visit a single park but end up paying for them.

If we are to link the nature around people to the nature in the parks, we must start studying the degraded natural environments that they live with. Speaking disparagingly of

coffee and sugar fields, of the "living dead", has become fashionable, but remains shortsighted. There seems an attitude that environments must be pure or they are not worth saving or studying. One biologist even suggested paving the area around parks to avoid contamination by second growth. The "living dead" toucan wandering through a coffee plantation may be the one link of a suburban child with all the "viable" toucans in parks. Coffee plantations with shade trees can swarm with life: imagine the impact if school children learn that plantations are interesting, but drab compared to the real forest their future tax-paying will protect.

The next step perhaps is to do what we do so well in "developed" countries: manage the countryside for what wildlife remains. We could get school children involved in local wildlife projects. Insects dependent on single plant species could benefit from deliberate plantings by school groups. Bird boxes could increase populations of hole-nesting species. Butterfly gardens could be planted around schools. Degraded riverine 'forest', too scraggly or flood-prone to be worth removing, could be improved, and trails installed, as local nature areas, for use in school nature classes. We will almost certainly never know how many invertebrate species will be saved by such 'pocket' parks.

Much of this activity might increase already common species, but it would pave the way for more extensive efforts toward maintaining a diverse environment. The "greening" of the tropics could begin again, expanding the areas available for

habitat-tolerant species, and making it easier for deep-forest species to wander from refuge to refuge. Again all this requires basic research which has to start now if it is to supply knowledge when needed.

3) Restoration With the steady growth of cities and increasing difficulties of agriculture in less and less suitable environments, land should increasingly fall fallow, as people give up and crowd into the cities. This is already happening locally in Costa Rica and Mexico. Urban living, improved standards of life, and birth-control incentives will result in falling birth rates and stable populations within a century or two (Ehrlich 1985), leading to reduced pressure to exploit the surviving wildlands. Indeed, natural habitats around parks would expand, allowing larger minimal populations, less vulnerable to extinction.

Restoration efforts before human population equilibrium and urbanization would be a the forlorn effort of a few in the face of the millions of machete-wielding campesinos. There may be exceptions such as very small, potentially valuable areas or habitats such as dry forest where so little survives that any restoration could have a major impact (cf. Janzen 1986b).

We can allow natural restoration to just happen, indeed mostly it will just happen, but we can also speed up the process and improve the richness of the result, if we know something of how the original habitat worked and how succession occurs, what species used to be there, and how they fit together as a community. Creative restocking of certain plants, insects and

animals may allow a much more complex environment earlier in succession than would occur naturally. If we have studied invasions by non-pest species in parks and preserved wildlands, as well as in 'degraded' environments, we can make reintroduction a routine tool, instead of a lottery. Deep-forest trees could perhaps be used in reforesting devastated areas and thus in speeding up succession, if we learn to artificially provide the right shade and moisture conditions, but this will require extensive 'pure' research on the tolerances of such species.

It is unlikely that the restoring will ever produce pristine forest, although the Mayan and Aztec milpa fields of Mesoamerica looked suspiciously like primordial forest to biologists and explorers before the deforestation of the last several decades. Nor will we be able to lock up restored forest in parks. Instead, we have an opportunity to develop the much-talked about but still little-implemented idea of sustainable development. For the remaining rural communities, suffering continued migration to the cities, reforestation and sustained use of forest products could in theory provide a better life than its deforested predecessor. However, we need to start now, developing an idea of sustainable levels of exploitation of trees and forest animals. We also must get economists and sociologists involved, so biological schemes can prosper economically and function in rural communities. Biologists by nature are often solitary and dogmatic, so we may not be the best ones to implement sustainable development schemes. We should develop ideas and pass sufficient information to others,

with greater social graces, for implementation.

Discussion This then is a plea for basic research, not necessarily along rigid lines of what is most likely to be useful, but organized in a framework where the underlying needs of conservation biology are kept in mind and the results are applied when possible, or kept until they are needed. We can not tell if a 'dry' list of the host plants of a genus of tropical moths will be more useful than a study of jaguar genetics; we can strive, however, to think of how our work will let us preserve and eventually restore tropical diversity. In the process of getting to know our beasties before we test hypotheses with them, many of us end up with data that a future ecological manager would covet. Others could collect such data without too much additional work. Even simple inventories of intact habitat today may be worth more than all the king's horses and all the king's men in the future. Switching from natural history to hypothesis-testing may have been a good strategy professionally for today's ecologists but it may earn us little respect a century or so from now, when future biologists try to understand exactly in what sorts of environments we tested our hypotheses. Shouldn't we leave our successors a few more clues than is presently fashionable? Unlike us, future managers won't know how it used to be, unless we tell them. What we do or don't do now in terms of research will determine what our successors can do hundreds of years from now. Science will have less and less to work with, so it will be less and less able to understand diversity, much less to

manipulate it.

Finally, ecologists may best serve our cause if they stop talking about 'megaspasms' of extinction and impending ecological doom. Perhaps we should rather emphasize the idea of an "ecological winter" (Moore 1985) when human population pressure forces nature into reserves. If we have made plans for that winter, and laid in stores of biological diversity, the winter's bright side would be its following spring, when stabilizing human populations would eventually allow us to come into balance with nature. This may take three or five centuries or even a millenium or two, but establishing and managing parks as arks to last through such periods will be far easier to sell to the public than will vague ideas of preserving biodiversity for some undefined perpetuity. Even if the "ecological spring" proves a myth, it offers more reason for a rear-guard action than does an open-ended, inevitable ecological doom.

DAVID CAMERON DUFFY

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Literature Cited

Burley, F.W. 1988. Monitoring biological diversity for setting priorities in conservation. Pages 227-230 in E.O. Wilson, F.M.

- Peter, editors. Biodiversity. National Academy Press, Washington, D.C., U.S.A.
- Diamond, J. 1986. The design of a nature reserve system for Indonesian New Guinea. Sunderland. Pages 485-503 in M.E. Soule, editor. Conservation biology: the science of scarcity and diversity. Sinauer Associates, Sunderland, Massachusetts, U.S.A.
- Ehrlich, A.H. 1985. The human population: size and dynamics. American Zoologist 25:395-406.
- Janzen, D.H. 1986a. The future of tropical ecology. Annual Review of Ecology and Systematics 17:305-324.
- Janzen, D.H. 1986b. Guanacaste National Park: tropical ecological and cultural restoration. Editorial Universidad Estatal a Distancia, San José, Costa Rica.
- Jenkins, Jr., R.E. 1988. Information management for the conservation of biodiversity. Pages 231-239 in E.O. Wilson, F.M. Peter, editors. Biodiversity. National Academy Press, Washington, D.C., U.S.A.
- Leigh, Jr. E.G. et al., editors. 1982. The ecology of a tropical forest: seasonal rhythms and long-term change. Smithsonian Press, Washington, D.C., U.S.A.
- Mares, M.A. 1986. Conservation in South America: problems, consequences, and solutions. Science 233:734-739.
- Myers, N. 1988. Tropical forest and their species: going, going. . .?

Pages 28-35 in E.O. Wilson, F.M. Peter, editors. Biodiversity. National Academy Press, Washington, D.C., U.S.A.

Moore, J.A. 1985. Science as a way of knowing--human ecology: opening remarks. *American Zoologist* 25:377-378.

Slatkin, M. 1985. Gene flow in natural populations. *Annual Review of Ecology and Systematics* 16:393-430.

Soulé, M. 1986. Conservation biology and the "real world". Pages 1-12 in M.E. Soulé, editor. *Conservation biology: the science of scarcity and diversity*. Sinauer Associates, Sunderland, Massachusetts, U.S.A.

Soulé, M.E. et al. 1979. Benign neglect: a model of faunal collapse in the game reserves of East Africa. *Biological Conservation* 15:259-272.



Milwaukee Public Museum

800 W. Wells St. Milwaukee, WI 53233 414/278-2702

Natural and human history

September 7, 1988

The Honorable James H. Scheuer, Chairman,
Subcommittee on Natural Resources,
Agriculture Research and Environment,
US House of Representatives
Washington, DC 20515

Dear Mr. Scheurer:

At our recent annual meeting, the American Fern Society, Inc., with 1,400 members, endorsed the following resolution regarding a National Biological Diversity Bill.

Whereas biological diversity is indispensable to the functioning of ecosystems, provides raw materials, products, and ideas for human civilization, and provides esthetic pleasure, emotional well-being, and spiritual enlightenment;

Whereas the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate is certain to increase greatly over the next several decades;

Whereas the deterioration of the biological diversity of the planet is a significant concern of scientists, and a serious problem for humanity;

Whereas, The United States is being asked to take a leadership role internationally, but does not have a Federal policy toward conservation of biological diversity;

Whereas, scientific understanding of the components of biological diversity is inadequate for its conservation and sustainable utilization;

Therefore be it resolved that the American Fern Society, Inc. asks the Congress of the United States to approve legislation that will:

- 1) make the conservation of biological diversity a national goal and a national priority;
- 2) require biological diversity to be a paramount consideration in land-use planning;
- 3) support efforts to understand biological diversity by creation of a national Center for Biological Diversity;

Biological Diversity Bill

September 7, 1988
Page 2

- 4) to put our scientific knowledge to use in developing a Federal Biodiversity Strategy aided by National Scientific Advisory Committee on Biological Diversity;
- 5) increase support for basic and applied research in systematics, organismal biology, and ecology.

Sincerely,

W. Carl Taylor

W. Carl Taylor, Ph.D.
Secretary, AFS

WCT/pm

cc: Judith E. Skog, Ph.D.
President, AFS

The Ecological Society of America

Public Affairs Office
730 11th Street, NW Suite 400
Washington, DC 20001-4584
(202) 393-5566

30 August 1988

The Honorable James H. Scheuer, Member
Committee on Science, Space, and Technology
United States House of Representatives
2466 Rayburn House Office Building
Washington, D.C. 20515

Dear Representative Scheuer:

Members of The Ecological Society of America want to congratulate you for your introduction of H.R. 4335, The National Biological Diversity Conservation and Environmental Research Act. At our recent Annual Meeting, members of The Ecological Society passed the following resolution on biological diversity which we would like to bring to your attention:

WHEREAS, biological diversity is an important component of the functioning of ecosystems, provides raw materials, products, and ideas for human civilization, and provides pleasure and emotional well-being for many;

WHEREAS, the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate appears likely to increase greatly over the next several decades;

WHEREAS, the deterioration of the Earth's biological diversity is a significant concern of scientists, and a serious problem for humanity;

WHEREAS, The United States is being asked to take a leadership role internationally, but does not have a Federal policy toward conservation of biological diversity;

WHEREAS, scientific understanding of the components of biological diversity must be increased for their conservation and sustainable utilization;

THEREFORE BE IT RESOLVED that The Ecological Society of America asks the Congress of the United States to approve legislation that will:

- 1) make the conservation of biological diversity a national goal and a national priority;
- 2) require biological diversity to be a paramount consideration in land-use planning;

3) support efforts to develop a coherent scientific program for research on biological diversity;

4) put scientific knowledge to use in developing a Federal Biodiversity Strategy by coordinating the policy efforts of federal agencies;

5) increase support for public education on the importance of preserving biodiversity.

Sincerely yours,

Marjorie M. Holland

Marjorie M. Holland, Ph.D.
Director

cc: Dr. Harold A. Mooney, President, Ecological Society of America
Dr. Paul G. Risser, Chair, Public Affairs Committee



DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20250

Honorable Robert A. Roe
Chairman, Committee on Science,
Space and Technology
U.S. House of Representatives
Washington, DC 20515

August 25 1988

Dear Mr. Chairman:

As you requested, here is our report on H.R. 4335, a bill "To establish a national policy for the conservation of biological diversity; to support environmental research and training necessary for conservation and sustainable use of biotic natural resources; to establish mechanisms for carrying out the national policy and for coordinating related activities; and to facilitate the collection, synthesis, and dissemination of information necessary for these purposes."

The Department of Agriculture opposes enactment of H.R. 4335.

H.R. 4335 would require that effects on biological diversity be assessed in all evaluations of the environmental effects of major Federal actions. The bill would also establish a Federal strategy for the conservation of biological diversity, establish mechanisms for coordinating Federal, State, and private efforts to preserve biological diversity and natural environments, undertake a nationally coordinated effort to collect, synthesize, and disseminate information about biological diversity, support basic environmental research necessary for the conservation of biological diversity, and educate citizens regarding the importance of biological diversity.

H.R. 4335 would be implemented through the creation of a National Center for Biological Diversity and Environmental Research, an Interagency Working Committee on Biological Diversity, and a National Scientific Advisory Committee on Biological Diversity. Annual appropriations of \$5 million for FY 1989 and \$10 million each for FY 1990 and FY 1991 would be authorized to conduct a grant program and the activities of the National Center.

The overall goal of the Forest Service, as it manages the 191-million-acre National Forest System, is to sustain the variety of life in forest and rangeland ecosystems while simultaneously producing a variety of products and services for people. The National Forest Management Act of 1976 (NFMA) gave the Forest Service a strong and specific mandate to protect the biological

Honorable Robert A. Roe

2

diversity of the National Forests by requiring the agency to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives."

Under the guidelines set forth in the National Forest Management Act, we are completing the development of comprehensive land management plans for each of the 123 National Forests. These plans are developed by an interdisciplinary team with input from a variety of public interests. Our regulations guiding the development of these plans (36 CFR 219.1) require that the plans provide for diversity of plant and animal communities and tree species consistent with overall multiple-use objectives.

The Forest Service is currently examining its policies and strategies for conserving biological diversity and developing ways to blend that goal with other uses and values of the National Forest System. The Chief of the Forest Service has convened a group of scientists and resource managers to develop and carry out an action plan. This group, known as the Forest Service Steering Committee on Biological Diversity, is working to ensure that Forest Service policies on biological diversity are clear and consistent with legal requirements and the current level of scientific knowledge.

Because the scientific community has not yet agreed upon standardized terminology and definitions with regard to biological diversity, we believe it is premature to establish national definitions and a national strategy for biological diversity at this time. We also believe that the terminology in H.R. 4335 would be open to many alternative interpretations, thus creating serious practical problems.

Section 5(c) would require that "the actions, policies, and programs of all Federal agencies shall be consistent with the goal of conservation of biological diversity." We believe this goal would be impractical to implement within the context of the broadly worded definitions in section 3, the complex requirements of other laws and regulations, and the current level of scientific knowledge and practice.

Currently, the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4332(2)(C)(i)) requires that environmental impact statements assess the environmental impact of proposed major Federal actions affecting the quality of the human environment. Section 5(d) of H.R. 4335 would amend this section to require, in addition, an assessment of "any impacts on biological diversity." While the Forest Service does not currently use the biological diversity terminology in H.R. 4335, environmental impact statements prepared by the agency already address many issues related to the conservation of biological diversity. The requirement to address biological diversity effects specifically is unnecessary with respect to the National Forest System, and it would subject the NEPA process to additional appeals and litigation based on the almost unlimited interpretations and meanings of "biological diversity."

Honorable Robert A. Roe

3

We believe that the sharing of knowledge and experience among the involved Federal agencies will be essential to coordinate a national strategy for maintaining biological diversity. Thus, we think the idea of creating an interagency working committee and a scientific advisory committee should be considered within the Administration under existing authorities. We would certainly want to actively participate in the interagency committee if one is formed.

We strongly oppose the proposal in H.R. 4335 to establish an independent National Center for Biological Diversity and Environmental Research. We believe many of the proposed functions of the Center could be effectively carried out with less expense under existing authority by the Federal Coordinating Council for Science, Engineering, and Technology.

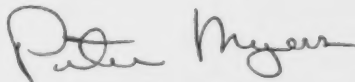
From a practical standpoint, we are very concerned about the items identified in section 8 as components of the Federal Biological Diversity Strategy. There is little scientific knowledge or agreed-upon technology available to address many of the 15 items identified in section 8(b). It is essential to recognize the very real limits of current scientific knowledge and practice. Meaningful action on some of the items would require data supplied by long-term monitoring and evaluation. Such long-term data, however, are not available for the vast majority of plant and animal species and would be very expensive to collect.

We do not see a need for financial grant authority (section 9) or for additional appropriations authority (section 11). The Forest Service has had a great deal of success in accomplishing a variety of high-priority work on the National Forest System through partnership arrangements with individuals and private non-profit organizations and associations. Volunteers and other cooperators have made substantial contributions to natural resource interpretative services, recreation facility and trail maintenance, and wildlife and fish habitat improvements. Similar cooperative efforts could be conducted with the primary goal of conserving biological diversity on the National Forest System.

In summary, we oppose enactment of H.R. 4335, because many of the objectives of the bill are already being met under existing authority, the bill would create unnecessary and duplicative coordinating mechanisms, and the bill would likely subject the NEPA process to many additional appeals and litigation.

The Office of Management and Budget advises that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely,



PETER C. MYERS
Acting Secretary



GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE

WASHINGTON, D.C. 20301-1600

26 AUG 1988

Honorable James H. Scheuer
 Chairman, Subcommittee on Natural Resources
 Agriculture Research and Environment
 U.S. House of Representatives
 Washington, D.C. 20515

Dear Mr. Chairman:

This is in response to your request for the views of the Department of Defense on H.R. 4335, 100th Congress, a bill "To establish a national policy for the conservation of biological diversity..." and other related purposes.

H.R. 4335 would require assessment of Federal actions' effects on biological diversity to be included in environmental assessments and impact statements. It states that conservation of biological diversity is a national goal. The bill establishes a National Center for Biological Diversity and Environmental Research and describes its functions and membership. Section 7 of the bill establishes an Interagency Working Committee on Biological Diversity of which the Department of Defense would be a member. The Interagency Committee is to develop a strategy to implement the national policy and goals of the bill. The bill also authorizes a Biological Diversity Grants program.

The Department of Defense supports the policy of conserving biological diversity, but objects to some of the specific provisions of H.R. 4335. For example, we object to Section 9(b), which sets forth certain environmental research and training requirements for each agency on the Interagency Committee. Section 9(b) mandates "...high priority to research and personnel training..." to implement the strategy developed by the Committee. As a general matter, we believe that management in each agency should determine priorities based on current circumstances, which are dynamic and different. Section 9(b) also requires Committee members to assess the adequacy of each respective agency's environmental research and training programs to support the policy and objectives of the bill. We do not believe this burden on each agency is useful or necessary. The strategy developed by the Committee should address the issue of research and training and develop appropriate mechanisms to evaluate and develop research and training programs.

We support the concept of an interagency body to coordinate governmental activities and provide leadership. However, authority to assemble such a body already exists and legislation is not necessary. The creation of a National Center for

Biological Diversity and Environmental Research is unnecessary and might weaken programs currently being carried out by executive agencies.

For these reasons, the Department of Defense does not recommend enactment of H.R. 4335.

The Office of Management and Budget advises that from the standpoint of the Administration's program, there is no objection to the submission of this report for the consideration of the Committee.

Sincerely,

A handwritten signature in cursive script, reading "Kathleen A. Buck". The signature is written in dark ink and is positioned above the printed name.

Kathleen A. Buck

BOTANICAL SOCIETY OF AMERICA
 W. Hardy Eshbaugh, President
 Department of Botany
 Miami University
 Oxford, Ohio 45056
 August 25, 1988

The Honorable James H. Scheuer
 Chairman
 The Subcommittee on Natural Resources
 Agriculture Research and Environment
 United States House of Representatives
 Washington, D.C. 20515

Dear Representative Scheuer:

The Botanical Society of America consists of 2700 members, most located in academic institutions across North America, but with members and professional affiliations throughout the world. Our members are dedicated to scientific research in plant science and to the application of information developed through research to the broader understanding of biosphere and its wise management. The BSA is one of the largest and oldest associations for the study of plant biology.

We support and applaud the efforts of members of Congress in the development of a national policy on biodiversity, as stated in the purposes and goals of HR 4335, summarized in the bill's opening paragraph:

"To establish a national policy for the conservation of biological diversity; to support environmental research and training necessary for conservation and sustainable use of biotic natural resources; to establish mechanisms for carrying out the national policy and for coordinating related activities; and to facilitate the collection, synthesis, and dissemination of information necessary for these purposes."

We agree strongly with the intent of this proposed legislation, as expressed in the concepts stated in the attached resolution. We support the coordinated collection, dissemination, and utilization of scientific information in the furtherance of development and implementation of a sound policy and management plan regarding biodiversity.

The diverse resources of the membership of the Botanical Society of America are available to you, should you desire our expertise in your deliberations.

We encourage your efforts on behalf of this critical issue.

Sincerely,

W. Hardy Eshbaugh

W. Hardy Eshbaugh,
 BSA President, on behalf of the Council
 and the Membership

Attachment: Resolution
 WHE:bws

RESOLUTION IN SUPPORT OF BIODIVERSITY LEGISLATION
BOTANICAL SOCIETY OF AMERICA
August 13, 1988

Whereas biological diversity is indispensable to the functioning of ecosystems, provides raw materials, products, and ideas for human civilization, and provides esthetic pleasure, emotional well-being, and spiritual enlightenment;

Whereas the Earth's biological diversity is now being reduced at a rate without precedent in human history and this rate is certain to increase greatly over the next several decades;

Whereas the deterioration of the biological diversity of the planet is a significant concern of scientists, and a serious problem for humanity;

Whereas, the United States is being asked to take a leadership role internationally, but does not have a Federal policy toward conservation of biological diversity;

Whereas, scientific understanding of the components of biological diversity is inadequate for its conservation and sustainable utilization;

Therefore be it resolved that the Botanical Society of America asks the Congress of the United States to approve legislation that will:

1. make the conservation of biological diversity a national goal and a national priority;
2. require biological diversity to be a paramount consideration in land-use planning;
3. coordinate efforts to collect and utilize scientific information to protect biological diversity, including development of an effective inter-agency biodiversity management strategy;
4. increase support for basic and applied research in systematics, organismal biology, and ecology.

Insert on page 39, line 868

The report was an inhouse document. It contained 5 recommendations which are addressed individually.

RECOMMENDATION #1. Convene a group of biologists from outside BLM with recognized expertise and interest in conservation of biological diversity on public lands to make recommendations to BLM managers on how to strengthen existing efforts and implement an integrated program.

1. An outside group has been formed and will meet August 14 and 15, 1988, in Davis, California. An agenda for that meeting and the objectives and participants is attached.

2. An internal management group is being formed. This will involve a State Director, at least two other managers and at least two biologists or botanists. The primary function of this group will be to evaluate the recommendations developed by the outside group and develop a strategy for carrying the recommendations that are accepted. The first meeting of this group should be early in FY 1989.

RECOMMENDATION #2. Designate a BLM biologist to coordinate efforts with other agencies and organizations working in this area, including but not limited to the Forest Service, National Park Service, The Nature Conservancy, Society for Conservation Biology, The Wildlife Society, and Society for Range Management.

1. William Radtkey, T/E Program Manager, has been assigned the overall responsibility for this effort at the program level. An initial group has been formed including the BLM, USFS, NPS, and the USFWS. Allen Cooperrider, Denver Service Center, has been assigned the responsibility for carrying out the technical coordination necessary to ensure agency efforts are consistent. Additional coordination will be carried out as needed and to make sure the program is carried out efficiently and with a minimum of duplication.

RECOMMENDATION #3. Develop a policy on conservation of biological diversity.

1. The final policy for this will be developed after meeting with outside groups and the deliberations of the BLM management group.

2. There is a policy statement in a draft revision of BLM Manual Section 6500. This policy is intended to address the components of biological diversity until a final policy is developed.

3. A goal for managing unique, rare, representative, and vulnerable plant communities has been included in Fish and Wildlife 2000. This is a recently issued plan which describes goals and objectives for more efficient management of fish and wildlife resources on the public lands.

RECOMMENDATION #4. Develop a BLM system for identifying, designating, protecting, and monitoring unique and representative biological communities on public lands.

We have not yet developed a program to implement this recommendation. We are looking at how existing BLM systems can be used in the process. These include the developing LIS system, the existing Wildlife Information System, the wilderness management system, and the existing planning system.

RECOMMENDATION #5. Initiate a program for inhouse training and education on conservation of biological diversity.

1. A training session has been developed titled Managing Habitat For Population Viability. This will be offered by the Phoenix Training Center in January 1989.

2. A video tape is being developed as an inhouse awareness tool. The draft script has been prepared and some of the video taping has been completed. This should be available by early next calendar year.

3. The next training material, addressing what biological diversity is, will probably be developed in cooperation with other agencies, especially some ongoing programs in the NPS, and offered as a joint course.

